UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2017 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Cummins Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: HCEXL050.AAD-024

Effective Date: 11/15/2016

Expiration Date: 12/31/2017

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/15/2016

Revision Date: N/A

Model Year: 2017
Manufacturer Type: Original Engine Manufacturer
Engine Family: HCEXL050.AAD

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 560<kW<=2237
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.

Certification Summary Information Report

Manufacturer	Cummins Inc.	**Manufacturer Code**	CEX
Engine Family	HCEXL050.AAD	**Certificate Number**	HCEXL050.AAD-024
Certificate Issue Date	11/15/2016	**Certificate Effective Date**	11/15/2016
Model Year	2017	**CARB Executive Order #**	N/A
Certificate Revision Date	N/A	**Certificate Revision Number**	0

Test Dataset numbers in this file:

General Information

Manufacturer Engine Family	D283	**CSI Type**	New Submission
Alternate Trade Names			
Manufacturer Type	Original Engine Manufacturer	**Branding Arrangement**	--
List Of Engine Families Modified	--		
Carry Over from a previous Engine Family?	Yes	**Carry Over Engine Family Name**	FCEXL050.AAD
Running Change(s)	--		
Field Edits			
Mobile/Stationary Application	Stationary	**Application Federal Regulation**	Part 60 only certified to the requirements of part 89
Application Tier	Tier 2	**Applicable Compliance Standard**	Not Applicable
Offset Engines	None	**Certification based on CARB Executive Order?**	No
Combining Engines from Multiple Power Categories?	Yes	**Power Category**	560<kW<=2237
Includes Engines for Electrical Generator set?	Yes	**If used for a Stationary Fire Pump, is rated speed > 2650?**	No
Limited Application	Emergency Stationary		
Limited Application Enforcement Description	These engines are labeled per the requirements of 40CFR60.4202. The label states the engine operation is limited to emergency operation		

ABT and FEL Information

Participating in Averaging, Banking, and Trading Program?	No	**Alternate Family Emission Limit Caps used?**	Yes

Not to Exceed (NTE) Compliance Information

Ambient Operation Region for NTE Testing	Not Temperature Limited

NTE Testing and Approach Description

This emergency stationary family is not subject to NTE requirements

Are you petitioning EPA to exclude operating points from NTE Testing because the engine is incapable of operation at those points?	No

Description of how the engine is incapable of operation at the excluded operating points

Limit NTE Testing in a single defined region of speeds and loads?	No
Are you requesting approval for an NTE Deficiancy	No

Engine Description

Engine Combustion Cycle	4 Stroke Compression Ignition
Fuel Options	Single Fuel

Fuel #1

Fuel	300-500 ppm Low Sulfur Diesel	**Fuel (if other)**	--
Fuel Metering System	Direct Diesel Injection		

Engine Family Comments

--

Certification Summary Information Report

Engine Family	HCEXL050.AAD	**Model Year**	2017

Useful Life

Useful Life of the Engine Family 10 years / 8,000 hrs

Production Information

Total Projected Sales

Federal Projected Sales

California Projected Sales

Production Start Date

Production End Date

Manufacturing plant for these Engines Seymour Engine Plant, Daventry Engine Plant

Agents For Service in US AvinasChander Manivannan

U.S. Port of Import Name	City	State

Manufacturer Comments about this Engine Family

September 27, 2016 This is a MY2017 carryover application for engine family (HCEXL050.AAD). Previously certified as GCEXL050.AAD. EPA

Engine Family	HCEXL050.AAD	**Model Year**	2017

Emission Control Systems

Non-After Treatment Devices

Are Non-ATDs used on this Engine Family?	Yes	**Non-ATD Types**	Electronic Control

Additional Comments about these Non-ATDs

After Treatment Devices

Are After Treatement Devices used on this Engine Family?	No	**Will Engine Family be produced using Delegated Assembly?**	No
Is the Cost of ATD components included in the cost of engine?	--		

List of Components covered under Delegated Assembly exemption

Are Infrequent Adjustment Factors being used?	--

Auxillary Emissions Control Devices

Are Auxillary Emissions Control Devices used on this Engine Family?	Yes

AECD Device #1

AECD Name	Please see separate AECD document for this information	**Will Activation of AECD reduces Effectiveness of ECS?**	No

AECD Purpose

Please see separate AECD document for this information

AECD Sensed Parameters

Please see separate AECD document for this information

AECD Controlled Parameters

Please see separate AECD document for this information

Additional Comments about this AECD

--

Adjustable Parameters

Are Adjustable Parameters used with this Engine Family?	Yes

Adjustable Parameter #1

Adjustable Parameter Name	Idle Speed

Adjustable Parameter Description

600-900 RPM adjustable using electronic service tool

Engine Family	HCEXL050.AAD	**Model Year**	2017

Models and Parts

Engine Model #1

Engine Model	QSK19-C	**Engine Code**	2756:FR4463
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	597	2100
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
2715	1500	2100	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
1400	5	5	447	395

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964171	6		
Software Calibration 1	SC40360	1		
Software Calibration 1	SC40367	1		
Software Calibration 1	SC40368	1		
Software Calibration 1	SC40382	1		
Software Calibration 1	SC40429	1		
Software Calibration 1	SC40445	1		
Software Calibration 1	SC40452	1		
Software Calibration 1	SC40463	1		
Software Calibration 1	SC40486	1		
Software Calibration 1	SC40507	1		
Software Calibration 1	SC40551	1		

Engine Model #2

Engine Family	HCEXL050.AAD	**Model Year**	2017
Engine Model	QSK19-C	**Engine Code**	2756:FR4464
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	563	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
2987	1500	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
1350	5	5	447	428

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964171	6		
Software Calibration 1	SC40361	1		
Software Calibration 1	SC40384	1		
Software Calibration 1	SC40416	1		
Software Calibration 1	SC40491	1		
Software Calibration 1	SC40492	1		
Software Calibration 1	SC40495	1		
Software Calibration 1	SC40511	1		
Software Calibration 1	SC40517	1		
Software Calibration 1	SC40528	1		

Engine Model #3

Engine Model	QSK19-C	**Engine Code**	2756:FR4465
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Engine Family	HCEXL050.AAD	**Model Year**	2017

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	567	2100
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
2578	1500	2100	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
1400	5	5	447	375

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964171	6		
Software Calibration 1	SC40362	1		
Software Calibration 1	SC40363	1		
Software Calibration 1	SC40364	1		
Software Calibration 1	SC40426	1		
Software Calibration 1	SC40430	1		
Software Calibration 1	SC40437	1		
Software Calibration 1	SC40450	1		
Software Calibration 1	SC40453	1		
Software Calibration 1	SC40555	1		
Software Calibration 1	SC40570	1		

Engine Model #4

Engine Model	QSK19-C	**Engine Code**	3232:FR4515
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Engine Family	HCEXL050.AAD	**Model Year**	2017

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	597	1900

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
3000	1700	1900	N/A	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
1400	5	5	448	431

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2843401	1		
Sensor	2872279	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		**Rated Speed (RPM)**
Sensor	3865312	1		1800
Pressure Sensor 2	4076493	1		**Maximum Engine Power (Kw)**
Electronic Control Module 1	4921797	1		N/A
Fuel Injectors	4964171	6		**Fuel Rate at Rated Speed (mm3/stroke)**
Software Calibration 1	SC40465	1		517

Engine Model #5

Engine Model	QSK19-G	**Engine Code**	1485:FR4446
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	669

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
3549	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	517

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		

Engine Family	HCEXL050.AAD	**Model Year**	2017
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837533	1		
Fuel Injection Pump	2870940	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Pressure Sensor 1	4076493	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	4921684	1		500
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964171	6		
Software Calibration 1	SC40315	1		
Software Calibration 1	SC40324	1		
Software Calibration 1	SC40327	1		
Software Calibration 1	SC40328	1		

Engine Model #6

Engine Model	QSK19-G	**Engine Code**	1485:FR4451
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	634

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
3363	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	500

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837533	1		
Fuel Injection Pump	2870940	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Pressure Sensor 1	4076493	1		
Sensor	4921684	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Electronic Control Module 1	4921797	1		542
Fuel Injectors	4964171	6		
Software Calibration 1	SC40325	1		
Software Calibration 1	SC40326	1		
Software Calibration 1	SC40327	1		
Software Calibration 1	SC40328	1		
Software Calibration 1	SC40516	1		

Engine Model #7

Engine Model	QSK19-G4	**Engine Code**	3866:FR4581
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	669
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
3549	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	542

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Single
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881088	6		
Sensor	3085185	1		
Pressure Sensor 1	3408601	1		
Sensor	3865312	1		**Rated Speed (RPM)** 1500
Fuel Injection Pump	4306517	1		**Maximum Engine Power (Kw)**
Electronic Control Module 1	4995444	1		N/A
Software Calibration 1	SC40587	1		**Fuel Rate at Rated Speed (mm3/stroke)**

Engine Model #8

Engine Model	QSK19-G4	**Engine Code**	4270:FR4580
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	634

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
4036	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	638

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Single
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Part Usage End Date

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date
Turbo Charger 1	2839018	1	
Sensor	2872277	1	
Sensor	2872279	1	
Fuel Injectors	2881088	6	
Sensor	3085185	1	
Pressure Sensor 1	3408601	1	
Sensor	3865312	1	
Fuel Injection Pump	4306517	1	
Electronic Control Module 1	4995444	1	
Software Calibration 1	SC40586	1	

Engine Model #9

Engine Model	QSK19-G5	**Engine Code**	3302:FR4516
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942

Engine Family	HCEXL050.AAD	**Model Year**	2017

Engine Block Arrangement Inline

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	634	1500

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
4036	1500	1500	N/A	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	599	599

Method of Aspiration Turbocharged

Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series

Turbocharger Type(s) Non Waste Gate Turbocharger

Charge Cooler Type Both

Variable Valve Timing? No

Variable Valve Lift? No

Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area Both

Production Start Date

Production End Date

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		**Rated Speed (RPM)**
Pressure Sensor 2	4076493	1		1800
Electronic Control Module 1	4921797	1		**Maximum Engine Power (Kw)**
Fuel Injectors	4964171	6		N/A
Software Calibration 1	SC40472	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Software Calibration 1	SC40473	1		541
Software Calibration 1	SC40489	1		

Engine Model #10

Engine Model	QSK19-G5	**Engine Code**	3302:FR4517
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942

Engine Block Arrangement Inline

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	669

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
3549	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	541

Method of Aspiration Turbocharged

Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series

Turbocharger Type(s) Non Waste Gate Turbocharger

Engine Family	HCEXL050.AAD	**Model Year**	2017
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		**Rated Speed (RPM)** 1500
Pressure Sensor 2	4076493	1		**Maximum Engine Power (Kw)**
Electronic Control Module 1	4921797	1		N/A
Fuel Injectors	4964171	6		**Fuel Rate at Rated Speed (mm3/stroke)**
Software Calibration 1	SC40473	1		622
Software Calibration 1	SC40474	1		
Software Calibration 1	SC40475	1		

Engine Model #11

Engine Model	QSK19-G5	**Engine Code**	3302:FR4524
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	701
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
4463	1500	1500	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	622

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		**Rated Speed (RPM)** 1800
Pressure Sensor 2	4076493	1		**Maximum Engine Power (Kw)**
Electronic Control Module 1	4921797	1		N/A
Fuel Injectors	4964171	6		**Fuel Rate at Rated Speed (mm3/stroke)**
Software Calibration 1	SC40472	1		601
Software Calibration 1	SC40473	1		
Software Calibration 1	SC40489	1		

Engine Model #12

Engine Model	QSK19-G8	**Engine Code**	3866:FR4582
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	721

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
3825	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	601

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Single
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Part Usage End Date

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date
Turbo Charger 1	2839020	1	
Sensor	2872277	1	
Sensor	2872279	1	
Fuel Injectors	2881088	6	
Sensor	3085185	1	
Pressure Sensor 1	3408601	1	
Sensor	3865312	1	
Fuel Injection Pump	4306517	1	
Electronic Control Module 1	4995444	1	
Software Calibration 1	SC40588	1	

Engine Model #13

Engine Family	HCEXL050.AAD	**Model Year**	2017
Engine Model	QSK19	**Engine Code**	3242:FR4511
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	563	1800

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
2987	1500	1800	N/A	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
1400	5	5	439.7	427.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Fuel Injectors	2867147	6		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC40536	1		

Rated Speed (RPM)
2100

Maximum Engine Power (Kw)
N/A

Engine Model #14

Fuel Rate at Rated Speed (mm3/stroke)
377.6

Engine Model	QSK19	**Engine Code**	3242:FR4549
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	567

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
2578	1500	2100	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
1400	5	5	450

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		

Engine Family	HCEXL050.AAD	**Model Year**	2017
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Fuel Injectors	2867147	6		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		**Rated Speed (RPM)** 1900
Pressure Sensor 2	4076493	1		**Maximum Engine Power (Kw)**
Electronic Control Module 1	4995444	1		N/A
Software Calibration 1	SC40533	1		
Software Calibration 1	SC40535	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Software Calibration 1	SC40834	1		442.9

Engine Model #15

Engine Model	QSK19	**Engine Code**	3242:FR4551
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	597

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
3000	1700	1900	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
1400	5	5	449.7

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Fuel Injectors	2867147	6		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		**Rated Speed (RPM)** 2100
Pressure Sensor 2	4076493	1		**Maximum Engine Power (Kw)**
Electronic Control Module 1	4995444	1		N/A
Software Calibration 1	SC40524	1		
Software Calibration 1	SC40532	1		**Fuel Rate at Rated Speed (mm3/stroke)** 395.4

Engine Model #16

Engine Model	QSK19	**Engine Code**	3716:FR4555
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	597

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
2715	1500	2100	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
1400	5	5	437.1

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Part Usage End Date

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date
Turbo Charger 1	2843401	1	
Sensor	2872279	1	
Fuel Injection Pump	2888712	1	
Sensor	3085185	1	
Pressure Sensor 3	3408600	1	
Sensor	3865312	1	
Pressure Sensor 2	4076493	1	
Fuel Injection Pump	4306517	1	
Fuel Injectors	4964171	6	
Electronic Control Module 1	4995444	1	
Software Calibration 1	SC40538	1	

Engine Model #17

Engine Family	HCEXL050.AAD	**Model Year**	2017
Engine Model	QSK19	**Engine Code**	3716:FR4707
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	563	1900
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
3163	1700	2100	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
1400	5	5	440	393.5

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2843401	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306517	1		
Fuel Injectors	4964171	6		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC40796	1		

Rated Speed (RPM) 1900
Maximum Engine Power (Kw)
N/A
Fuel Rate at Rated Speed (mm3/stroke)
477.1

Engine Model #18

Engine Model	QSK19	**Engine Code**	3716:FR4708
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	18.942
Engine Block Arrangement	Inline		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
6	159	159	620
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
3460	1700	2100	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
1400	5	5	482

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	1	**Aspiration Device Configuration**	Series

Engine Family	HCEXL050.AAD	**Model Year**	2017
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2843401	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		**Rated Speed (RPM)** 1500
Fuel Injection Pump	4306517	1		**Maximum Engine Power (Kw)**
Fuel Injectors	4964171	6		N/A
Electronic Control Module 1	4995444	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Software Calibration 1	SC40797	1		503

Engine Model #19

Engine Model	QSK38-G2	**Engine Code**	3268:FR6700
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1098

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
6990	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	503

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4049911	2		
Turbo Charger 2	4049911	2		
Pressure Sensor 1	4076493	1		
Sensor	4307466	1		
Sensor	4910465	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	12		
Software Calibration 1	SC60533	1		
Software Calibration 1	SC60534	1		

Rated Speed (RPM) 1500

Maximum Engine Power (Kw)
N/A

Fuel Rate at Rated Speed (mm3/stroke)
442

Engine Model #20

Engine Model	QSK38-G2	**Engine Code**	3268:FR6701
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	970

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
6175	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	442

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4049911	2		
Turbo Charger 2	4049911	2		
Pressure Sensor 1	4076493	1		
Sensor	4307466	1		
Sensor	4910465	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	12		
Software Calibration 1	SC60535	1		
Software Calibration 1	SC60536	1		

Rated Speed (RPM) 1800

Maximum Engine Power (Kw)
N/A

Fuel Rate at Rated Speed (mm3/stroke)
486

Engine Model #21

Engine Model	QSK38-G	**Engine Code**	3267:FR6964
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1280

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
6790	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	486

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4049908	1		
Turbo Charger 1	4049908	2		
Pressure Sensor 1	4076493	1		
Sensor	4307466	1		
Sensor	4910465	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	12		
Software Calibration 1	SC61025	1		

Rated Speed (RPM) 1500

Maximum Engine Power (Kw)
N/A

Fuel Rate at Rated Speed (mm3/stroke)
552

Engine Model #22

Engine Model	QSK38-G3	**Engine Code**	3266:FR6698
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1224

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
7792	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	552

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4049902	2		
Turbo Charger 1	4049902	2		
Pressure Sensor 1	4076493	1		
Sensor	4307466	1		
Sensor	4910465	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	12		
Software Calibration 1	SC60530	1		

Rated Speed (RPM) 1500

Maximum Engine Power (Kw)
N/A

Fuel Rate at Rated Speed (mm3/stroke)
430.3

Engine Model #23

Engine Model	QSK38-G	**Engine Code**	3570:FR6786
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	969

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
6169	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	430.3

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	2867147	12		
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Fuel Injection Pump	2888748	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		**Rated Speed (RPM)** 1500
Pressure Sensor 2	3408602	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Sensor	3865312	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	4049911	1		488.6
Turbo Charger 2	4049911	1		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306516	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60710	1		
Software Calibration 1	SC60711	1		

Engine Model #24

Engine Model	QSK38-G	**Engine Code**	3570:FR6787
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1096

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
6977	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	488.6

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Fuel Injectors	2867147	12		
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Fuel Injection Pump	2888748	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		**Rated Speed (RPM)**
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4049911	2		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306516	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60714	1		

Engine Model #25

Engine Model	QSK38-G	**Engine Code**	3571:FR6788
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
12	159	159	1224	1500
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
7792	1500	1500	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	546.9	546.9

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Sensor	3865312	1		**Rated Speed (RPM)** 1800
Turbo Charger 2	4049902	1		**Maximum Engine Power (Kw)**
Turbo Charger 1	4049902	1		N/A
Pressure Sensor 1	4076493	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Fuel Injection Pump	4306516	1		513.9
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60714	1		

Engine Model #26

Engine Model	QSK38-G	**Engine Code**	3572:FR6789
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1376

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
7300	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	513.9

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Pressure Sensor 2	3408602	1		
Turbo Charger 1	3774206	1		
Turbo Charger 2	3774206	1		**Rated Speed (RPM)** 1800
Sensor	3865312	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Pressure Sensor 1	4076493	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Fuel Injection Pump	4306516	1		486.4
Sensor	4307466	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60716	1		

Engine Model #27

Engine Model	QSK38-G	**Engine Code**	3573:FR6797
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1279

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
6785	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	486.4

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Sensor	3865312	1		
Turbo Charger 2	4049908	2		
Turbo Charger 1	4049908	2		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306516	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60718	1		

Rated Speed (RPM) 1800

Maximum Engine Power (Kw)
N/A

Fuel Rate at Rated Speed (mm3/stroke)
382

Engine Model #28

Engine Model	QSK38-G4	**Engine Code**	3265:FR6697
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
12	159	159	1376

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
7300	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	382

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Fuel Injection Pump	2870939	1		
Sensor	2872304	1		
Fuel Injection Pump	2888748	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Turbo Charger 2	3774206	2		**Rated Speed (RPM)**
Turbo Charger 1	3774206	2		
Sensor	3865312	1		
Turbo Charger 2	4049905	2		
Turbo Charger 1	4049905	2		
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	12		
Software Calibration 1	SC60527	1		
Software Calibration 1	SC60528	1		

Engine Model #29

Engine Model	QSK38-G5	**Engine Code**	3267:FR6699
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	37.885
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
12	159	159	1280	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
6790	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	486	486

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4049908	2		
Turbo Charger 1	4049908	2		**Rated Speed (RPM)** 1200
Pressure Sensor 1	4076493	1		**Maximum Engine Power (Kw)**
Sensor	4307466	1		N/A
Sensor	4910465	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Electronic Control Module 1	4921797	1		480
Fuel Injectors	4964172	12		
Software Calibration 1	SC60531	1		
Software Calibration 1	SC60532	1		

Engine Model #30

Engine Model	QSK50-DR	**Engine Code**	2912:FR6622
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1104
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8785	1200	1200	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	480

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		**Rated Speed (RPM)**
Sensor	3865312	1		
Turbo Charger 1	4047336	2		
Turbo Charger 2	4047336	2		
Sensor	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60371	1		
Software Calibration 1	SC61258	1		

Engine Model #31

Engine Model	QSK50-G	**Engine Code**	2771:FR6621
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
16	159	159	1559	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
8270	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	447	447

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Turbo Charger 2	4044551	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	4044551	2		406
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60386	1		
Software Calibration 1	SC60465	1		

Engine Model #32

Engine Model	QSK50-G	**Engine Code**	2771:FR6667
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1396
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
7406	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	406

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Turbo Charger 1	4044551	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 2	4044551	2		480
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60386	1		
Software Calibration 1	SC60463	1		
Software Calibration 1	SC60464	1		

Engine Model #33

Engine Model	QSK50-G	**Engine Code**	2771:FR6692
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1655

Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A

Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	480

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Turbo Charger 2	4044551	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	4044551	2		483
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Sensor	4951941	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60386	1		
Software Calibration 1	SC60561	1		

Engine Model #34

Engine Model	QSK50-G	**Engine Code**	3138:FR6641
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1655

Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A

Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	483

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Turbo Charger 1	3774217	2		N/A
Turbo Charger 2	3774217	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	3865312	1		509
Turbo Charger 2	4043346	2		
Turbo Charger 1	4043346	2		
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60403	1		
Software Calibration 1	SC60404	1		

Engine Model #35

Engine Model	QSK50-G	**Engine Code**	3139:FR6642
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1749
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
9278	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	509

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837527	2		
Turbo Charger 2	2837527	2		
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		**Rated Speed (RPM)** 1800
Fuel Injection Pump	2888810	1		**Maximum Engine Power (Kw)**
Sensor	3085185	1		N/A
Pressure Sensor 1	3408600	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	3865312	1		480
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60406	1		
Software Calibration 1	SC60407	1		
Software Calibration 1	SC60408	1		

Engine Model #36

Engine Model	QSK50-G	**Engine Code**	3140:FR6643
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1655

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
8780	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	480

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Turbo Charger 1	2837528	2		
Turbo Charger 2	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		**Rated Speed (RPM)** 1500
Fuel Injection Pump	2888810	1		**Maximum Engine Power (Kw)**
Sensor	3085185	1		N/A
Pressure Sensor 1	3408600	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	3865312	1		548
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60409	1		
Software Calibration 1	SC60410	1		

Engine Model #37

Engine Model	QSK50-G	**Engine Code**	3140:FR6653
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1581
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
10000	1500	1500	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	548

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Turbo Charger 1	2837528	2		
Turbo Charger 2	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		**Rated Speed (RPM)** 1800
Fuel Injection Pump	2888810	1		**Maximum Engine Power (Kw)**
Sensor	3085185	1		N/A
Pressure Sensor 1	3408600	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	3865312	1		480
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60500	1		
Software Calibration 1	SC60501	1		

Engine Model #38

Engine Model	QSK50-G	**Engine Code**	3227:FR6692
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1655
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	480

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4044551	2		
Turbo Charger 2	4044551	2		
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60561	1		

Rated Speed (RPM) 1800

Maximum Engine Power (Kw)

N/A

Fuel Rate at Rated Speed (mm3/stroke)

480

Engine Model #39

Engine Model	QSK50-G	**Engine Code**	3377:FR6730
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1655

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
8780	1800	1800	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	480

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		**Rated Speed (RPM)** 1500
Pressure Sensor 1	3408602	1		**Maximum Engine Power (Kw)**
Turbo Charger 1	3774210	2		N/A
Turbo Charger 2	3774210	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	3865312	1		492
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Electronic Control Module 1	4921797	1		
Sensor	4951491	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60616	1		

Engine Model #40

Engine Model	QSK50-G	**Engine Code**	3621:FR60222
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1456

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
9399	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	492

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	2867147	16		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60799	1		
Software Calibration 1	SC61589	1		
Software Calibration 1	SC61705	1		

Engine Model #41

Engine Model	QSK50-G	**Engine Code**	3621:FR60222G
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
16	159	159	1655	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	474.2	474.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	2867147	16		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Pressure Sensor 2	3408602	1		N/A
Sensor	3865312	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	4044551	2		474.2
Turbo Charger 2	4044551	2		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60799	1		
Software Calibration 1	SC61589	1		
Software Calibration 1	SC61705	1		

Engine Model #42

Engine Model	QSK50-G	**Engine Code**	3621:FR60344
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1655
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	474.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 2	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Turbo Charger 1	4044551	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 2	4044551	2		390.8
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		
Software Calibration 1	SC61702	1		

Engine Model #43

Engine Model	QSK50-G	**Engine Code**	3621:FR6832
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1396
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
7406	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	390.8

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		**Rated Speed (RPM)** 1800
Sensor	3085185	1		**Maximum Engine Power (Kw)**
Pressure Sensor 1	3408600	1		N/A
Pressure Sensor 2	3408602	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	3774210	2		375.6
Turbo Charger 2	3774210	2		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60786	1		

Engine Model #44

Engine Model	QSK50-G	**Engine Code**	3621:FR6833
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1559
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8270	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	375.6

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		**Rated Speed (RPM)** 1800
Sensor	3085185	1		**Maximum Engine Power (Kw)**
Pressure Sensor 1	3408600	1		N/A
Pressure Sensor 2	3408602	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	3774210	2		375.6
Turbo Charger 2	3774210	2		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60788	1		
Software Calibration 1	SC61626	1		

Engine Model #45

Engine Model	QSK50-G	**Engine Code**	3621:FR6834
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1559
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8270	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	375.6

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		**Rated Speed (RPM)** 1800
Sensor	3085185	1		**Maximum Engine Power (Kw)**
Pressure Sensor 1	3408600	1		N/A
Pressure Sensor 2	3408602	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	3774210	2		491.3
Turbo Charger 2	3774210	2		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60789	1		

Engine Model #46

Engine Model	QSK50-G	**Engine Code**	3621:FR6839
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1655
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1500	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
1350	5	5	521.9

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 1	3408600	1		**Maximum Engine Power (Kw)**
Pressure Sensor 2	3408602	1		N/A
Turbo Charger 2	3774210	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	3774210	2		474.2
Sensor	3865312	1		
Turbo Charger 1	4044551	2		
Turbo Charger 2	4044551	2		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60799	1		

Engine Model #47

Engine Model	QSK50-G	**Engine Code**	3621:FR6879
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1655
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	474.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		**Rated Speed (RPM)** 1800
Sensor	3085185	1		**Maximum Engine Power (Kw)**
Pressure Sensor 1	3408600	1		N/A
Pressure Sensor 2	3408602	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 2	3774210	2		474.2
Turbo Charger 1	3774210	2		
Sensor	3865312	1		
Turbo Charger 1	4044551	2		
Turbo Charger 2	4044551	2		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60844	1		

Engine Model #48

Engine Model	QSK50-G	**Engine Code**	3622:FR6838
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**
16	159	159	1655
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	474.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)**
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		

Engine Model #49

Engine Model	QSK50-G	**Engine Code**	3622:FR6840
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
16	159	159	1655	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	474.2	474.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)**
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4044551	2		
Turbo Charger 2	4044551	2		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		

Engine Model #50

Engine Model	QSK50-G	**Engine Code**	3622:FR6878
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
16	159	159	1655	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	474.2	474.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1500
Pressure Sensor 2	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Turbo Charger 1	4044551	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 2	4044551	2		492
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		
Software Calibration 1	SC60843	1		

Engine Model #51

Engine Model	QSK50-G	**Engine Code**	3622:FR6878G
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1476
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
9396	1500	1500	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	492

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)** 1800
Pressure Sensor 2	3408600	1		**Maximum Engine Power (Kw)**
Sensor	3865312	1		N/A
Turbo Charger 2	4044551	2		**Fuel Rate at Rated Speed (mm3/stroke)**
Turbo Charger 1	4044551	2		471.2
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		
Software Calibration 1	SC60843	1		

Engine Model #52

Engine Model	QSK50-G	**Engine Code**	3623:FR6835
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1655
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**
8780	1800	1800	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**
0	5	5	471.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		**Rated Speed (RPM)**
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Turbo Charger 1	4964172	2		
Turbo Charger 2	4964172	2		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60790	1		

Engine Model #53

Engine Model	QSK50-G	**Engine Code**	3624:FR6836
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
16	159	159	1749	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
9278	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	499.2	499.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017

Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 2	2837527	2		
Turbo Charger 1	2837527	2		
Turbo Charger 1	2837528	2		
Fuel Injectors	2881088	16		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		**Rated Speed (RPM)** 1500
Sensor	3085185	1		**Maximum Engine Power (Kw)**
Pressure Sensor 2	3408600	1		N/A
Sensor	3408647	1		**Fuel Rate at Rated Speed (mm3/stroke)**
Sensor	3865312	1		440.2
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60792	1		

Engine Model #54

Engine Model	QSK50-G	**Engine Code**	3625:FR6837
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)
16	159	159	1581

Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)
10000	1500	1500	N/A

Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)
0	5	5	440.2

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Turbo Charger 2	2837528	2		
Turbo Charger 1	2837528	2		
Sensor	2872304	1		
Fuel Injectors	2881088	16		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		**Rated Speed (RPM)**
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60794	1		

Engine Model #55

Engine Model	QSK50-G4	**Engine Code**	2771:FR6726
Displacement Per Cylinder (in liters)	3.16	**Total Displacement (in liters)**	50.513
Engine Block Arrangement	V-Shaped Engine		

Number of Cylinders	**Bore (mm)**	**Stroke (mm)**	**Rated Power (kW)**	
16	159	159	1655	1800
Maximum Torque (N*m)	**Speed at Maximum Torque (RPM)**	**Maximum Speed Test (RPM)**	**Torque at Maximum Speed (N*m)**	**Maximum Engine Power (Kw)**
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	**Lower Tolerance of Maximum Power (%)**	**Upper Tolerance of Maximum Power (%)**	**Fuel Rate at Maximum Torque (mm3/stroke)**	**Fuel Rate at Rated Speed (mm3/stroke)**
0	5	5	497	497

Method of Aspiration	Turbocharged		
Number of Aspiration Devices	2	**Aspiration Device Configuration**	Parallel
Turbocharger Type(s)	Non Waste Gate Turbocharger		
Charge Cooler Type	Both		
Variable Valve Timing?	No		
Variable Valve Lift?	No		
Number of Inlet Valves per cylinder	2	**Number of Exhaust Valves per cylinder**	2

Production and Sales Information

Sales Area	Both		
Production Start Date		**Production End Date**	

Engine Parts

Engine Family	HCEXL050.AAD	**Model Year**	2017	
Part Name	**Part Number**	**Part Quantity**	**Part Usage Start Date**	**Part Usage End Date**
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60386	1		
Software Calibration 1	SC60602	1		
Software Calibration 1	SC60603	1		
Software Calibration 1	SC61074	1		

Durability Information

DF Determination Factor Determined by Manufacturer

Durability Engines

Engine Name	**Engine Code**	**Engine Id**	**Engine Service Accumulation in hours**
SDA6D140E-3	2C09	3628579	1400

Deterioration Factors

Pollutant Name	**Deterioration Factor**	**Deterioration Factor Type**
Carbon Monoxide	0.007	Additive
Nitrogen Oxides	0	Additive
Smoke-Accel	0.5	Additive
Particulate Matter	0.013	Additive
Smoke-Peak	0.5	Additive
Smoke-Lug	1	Additive
Non-Methane Hydrocarbons	0	Additive

Engine Family	HCEXL050.AAD	**Model Year**	2017

Carryover Test Information

Test Dataset #1

Test Data Type	Test data for a current engine model in this Engine Family		
Verify Test Dataset Number	FCEXLM0005163	**Manufacturer Test Dataset Number**	--
Engine Model	QSK19-G	**Engine Code**	1485:FR4446
Engine Id	33170354	**Engine Displacement (in liters)**	18.942
Number of hours Engine was run prior to test	125	**Crankcase Emission Discharge Path**	CCEs Routed into the Exhaust Downstream of After Treatment
Test Date	10/28/2005		
Test Fuel	300-500 ppm Low Sulfur Diesel		
Special Test Procedure Used	No		
Test Lab Name	CIC Emissions Lab	**Test Lab Code**	4
Engine Operation	Variable Speed	**Steady-State Cycle Type**	Steady-State 8-Mode Cycle
Steady-State Modal Testing Type	Ramped-Modal Testing	**Steady-state Cycle Work (kW-hr)**	--
Transient Test Required	No		
Transient Hot Start Cycle Work (kW-hr)	--	**Transient Cold Start Cycle Work (kW-hr)**	--
Devices Regenerated during Steady State Test (Ramped Model)	None		
Devices Regenerated during Cold Start of a Transient Test	None		
Devices Regenerated during Hot Start of a Transient Test	None		
Test Comments			

Smoke Test Results

Smoke Type	Test Result (Initial) (%)	Certification Level (%)	EPA Standard (%)	Pass/Fail Indicator
Smoke-Peak	13.6	14	50	Pass
Smoke-Accel	11.9	12	20	Pass
Smoke-Lug	2.1	3	15	Pass

Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Initial) (g/kW-hr)
Carbon Dioxide	705
Nitrogen Oxides	5.65
Nitrogen Oxides plus Non-Methane Hydrocarbons	--
Particulate Matter	0.063
Carbon Monoxide	1.75
Non-Methane Hydrocarbons	0.14

Certification Level Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Adjusted) (g/kW-hr)	Certification Emission Result (g/kW-hr)	EPA Standard Limit (g/kW-hr)	Family Emission Limit (g/kW-hr)	Pass/Fail Indicator
Particulate Matter	0.063	0.08	0.20	--	Pass
Nitrogen Oxides	5.65	5.65	--	--	--
Carbon Monoxide	1.75	1.8	3.5	--	Pass
Carbon Dioxide	705	705.00	--	--	--
Non-Methane Hydrocarbons	0.14	0.14	--	--	--
Nitrogen Oxides plus Non-Methane Hydrocarbons	--	5.8	6.4	--	Pass

Engine Family	HCEXL050.AAD	**Model Year**	2017

Manufacturer Test Information

Test Dataset #1

Test Data Type	Test data for a current engine model in this Engine Family		
Verify Test Dataset Number	HCEXLM0008028	**Manufacturer Test Dataset Number**	--
Engine Model	QSK19-G	**Engine Code**	1485:FR4446
Engine Id	33170354	**Engine Displacement (in liters)**	18.942
Number of hours Engine was run prior to test	125	**Crankcase Emission Discharge Path**	CCEs Routed into the Exhaust Downstream of After Treatment
Test Date	10/28/2005		
Test Fuel	300-500 ppm Low Sulfur Diesel		
Special Test Procedure Used	No		
Test Lab Name	CIC Emissions Lab	**Test Lab Code**	4
Engine Operation	Variable Speed	**Steady-State Cycle Type**	Steady-State 8-Mode Cycle
Steady-State Modal Testing Type	Ramped-Modal Testing	**Steady-state Cycle Work (kW-hr)**	78.07
Transient Test Required	No		
Transient Hot Start Cycle Work (kW-hr)	--	**Transient Cold Start Cycle Work (kW-hr)**	--
Devices Regenerated during Steady State Test (Ramped Model)	None		
Devices Regenerated during Cold Start of a Transient Test	None		
Devices Regenerated during Hot Start of a Transient Test	None		
Test Comments			

Smoke Test Results

Smoke Type	Test Result (Initial) (%)	Certification Level (%)	EPA Standard (%)	Pass/Fail Indicator
Smoke-Peak	13.6	14	50	Pass
Smoke-Accel	11.9	12	20	Pass
Smoke-Lug	2.1	3	15	Pass

Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Initial) (g/kW-hr)
Carbon Dioxide	705
Nitrogen Oxides plus Non-Methane Hydrocarbons	--
Particulate Matter	0.063
Carbon Monoxide	1.75
Nitrogen Oxides	5.65
Non-Methane Hydrocarbons	0.14

Certification Level Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Adjusted) (g/kW-hr)	Certification Emission Result (g/kW-hr)	EPA Standard Limit (g/kW-hr)	Family Emission Limit (g/kW-hr)	Pass/Fail Indicator
Carbon Dioxide	705	705.	--	--	--
Nitrogen Oxides plus Non-Methane Hydrocarbons	--	5.8	6.4	--	Pass
Particulate Matter	0.063	0.08	0.20	--	Pass
Carbon Monoxide	1.75	1.8	3.5	--	Pass
Nitrogen Oxides	5.65	5.65	--	--	--
Non-Methane Hydrocarbons	0.14	0.14	--	--	--

Engine Family	HCEXL050.AAD	**Model Year**	2017

Test Dataset #2

Test Data Type	Test data for a current engine model in this Engine Family		
Verify Test Dataset Number	HCEXLM0008027	**Manufacturer Test Dataset Number**	--
Engine Model	QSK19-G	**Engine Code**	1485:FR4446
Engine Id	33160795	**Engine Displacement (in liters)**	18.942
Number of hours Engine was run prior to test	125	**Crankcase Emission Discharge Path**	CCEs Routed into the Exhaust Downstream of After Treatment
Test Date	10/17/2005		
Test Fuel	300-500 ppm Low Sulfur Diesel		
Special Test Procedure Used	No		
Test Lab Name	CIC Emissions Lab	**Test Lab Code**	4
Engine Operation	Constant Speed	**Steady-State Cycle Type**	Steady-State 5-Mode Cycle
Steady-State Modal Testing Type	Ramped-Modal Testing	**Steady-state Cycle Work (kW-hr)**	78.07
Transient Test Required	No		
Transient Hot Start Cycle Work (kW-hr)	--	**Transient Cold Start Cycle Work (kW-hr)**	--
Devices Regenerated during Steady State Test (Ramped Model)	None		
Devices Regenerated during Cold Start of a Transient Test	None		
Devices Regenerated during Hot Start of a Transient Test	None		
Test Comments			

Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Initial) (g/kW-hr)
Non-Methane Hydrocarbons	0.19
Carbon Monoxide	1.17
Nitrogen Oxides	5.95
Particulate Matter	0.07
Carbon Dioxide	730
Nitrogen Oxides plus Non-Methane Hydrocarbons	--

Certification Level Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Adjusted) (g/kW-hr)	Certification Emission Result (g/kW-hr)	EPA Standard Limit (g/kW-hr)	Family Emission Limit (g/kW-hr)	Pass/Fail Indicator
Non-Methane Hydrocarbons	0.19	0.19	--	--	--
Carbon Monoxide	1.17	1.2	3.5	--	Pass
Nitrogen Oxides	5.95	5.95	--	--	--
Particulate Matter	0.07	0.08	0.20	--	Pass
Carbon Dioxide	730	730.	--	--	--
Nitrogen Oxides plus Non-Methane Hydrocarbons	--	6.1	6.4	--	Pass

Customer Engineering Bulletin

Title:	This CEB is for the following applications:
QSK50 EPA Tier 2 G-Drive Mechanical Product Information	☐ Automotive ☐ Industrial ☐ Marine ☒ G-Drive

Date: 10 February 2016	Refer to CEB00044 for Safety Practices, Guidelines and Procedures	CEB Number: 00093
Engine models included: QSK50-G NR2 (D283039GX03)		
Owner: Mark Bosserman	Approver: per Procedure GCE-AS-1	Page 1 of 15

This CEB supersedes CEB00093 dated 11 January 2016.

Introduction

This CEB introduces the Quantum QSK50 engine at Tier 2 emission levels from Cummins Inc. The QSK50 is a 16 cylinder engine with a 50 liter displacement. The engine has been designed to meet U.S. EPA Tier 2 mobile off-highway emission levels. The U.S. EPA Tier 2 mobile off-highway emission requirements became effective January 1, 2006 for ratings above 560 kW (751 hp), and expired January 1, 2011. These Tier 2 ratings are still available for stationary emergency application under the NSPS rule and for mobile application using the TPEM program.

The upgraded design includes a new high pressure Modular Common Rail fuel System and advanced electronic control module (ECM). New injectors, pistons, turbos, and valve covers have also been incorporated into the configuration. A 2-pump, 2-loop Low Temperature Aftercooling (LTA) system will be utilized to deliver the intake manifold temperatures that are required for Tier 2 emission levels.

Purpose

The purpose of this document is to provide information about the hardware and performance of the QSK50, Tier 2 engine platform.

Table of Contents

Base Engine Discussion

Performance

The fuel ratings available for the QSK50 Tier 2 engine are based on the KTA50 engine ratings. The performance parts have been developed to meet Tier 2 emission levels, achieve the best possible fuel consumption, and achieve similar transient response to the KTA50.

Fuel Ratings and Altitude Capability

For the latest Fuel Ratings and altitude capability please refer to the link below.

https://gce.cummins.com/pgce/pg_main/g-drive_global_index.html

Engine Characteristics

Configuration	D283039GX03
Displacement	50 liter (3067 in^3)
Bore	158.75 mm (6.25 in)
Stroke	158.75 mm (6.25 in)
Weight	5410 kg (11927 lb) [est. dry]
Cylinder Configuration	16 cylinder (V-angle 60°)

Engine Envelope

Envelope Description	Dimension
Overall **Height** above the center line of crankshaft	1158 mm (45.6 in)
Overall **Height** below the center line of crankshaft	745 mm (29.3 in)
Overall **Length** from rear face of flywheel housing to fan drive mounting surface	2581 mm (101.6 in)
Overall **Width** at widest point	1492 mm (58.7 in)

Base Engine Components

Cylinder Block

The existing KTA50 cylinder block has been modified to include an additional turbo oil supply port for the QSK50. The KTA50 will also use this new modified block. The KTA50 will have a plug sealing this port.

Crankshaft

The QSK50 utilizes a crankshaft based upon the current KTA50 crankshaft. The QSK50 crankshaft includes a tone wheel that is pressed on to the rear of the crankshaft (see Figures 1 and 2). The tone wheel works with the engine crank position sensor to provide engine speed and position information to the ECM. The tone wheel is timed to the crankshaft via a key slot.

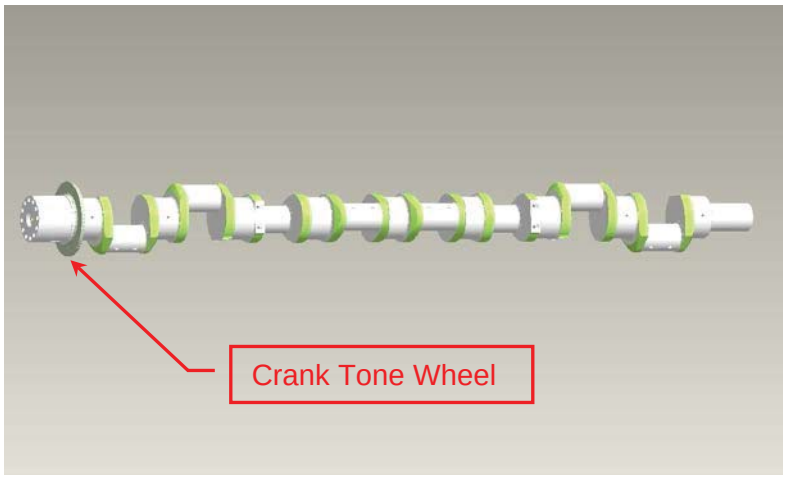


Figure 1

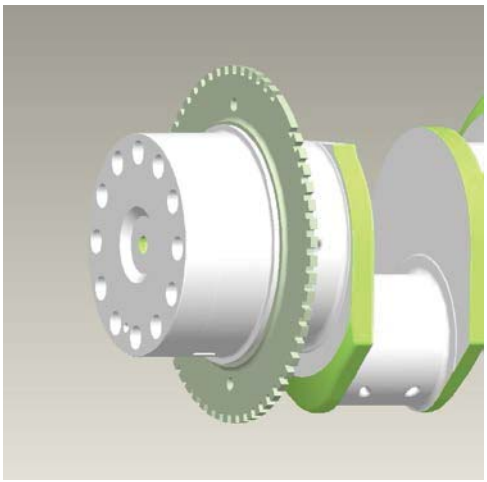


Figure 2

Camshaft

The existing KTA50 camshaft is utilized.

A single piece camshaft cover will continue to be used for this engine configuration.

Cam Followers

A modified version of the KTA50 series cam follower assembly has been incorporated into the new engine configuration. The center injector follower has been removed and a spacer has been added since the injectors are no longer mechanically actuated (see Figure 3).

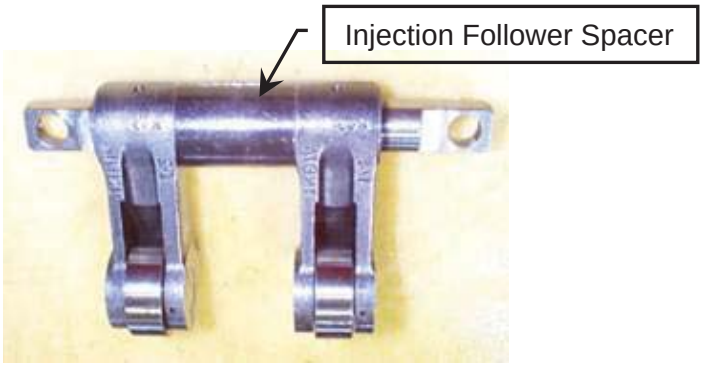


Figure 3

Piston

Ferrous Cast Ductile Iron (FCD) pistons have been incorporated into the new engine configuration. FCD pistons are also used on all other high horsepower engine products. The new piston has a compression ratio of 14.5:1.

Cylinder Head

A modified version of the KTA50 series cylinder head has been incorporated into the new engine configuration. The cylinder head has been modified to accommodate the new injectors, valve guides, valve stem seals, and fuel drain lines.

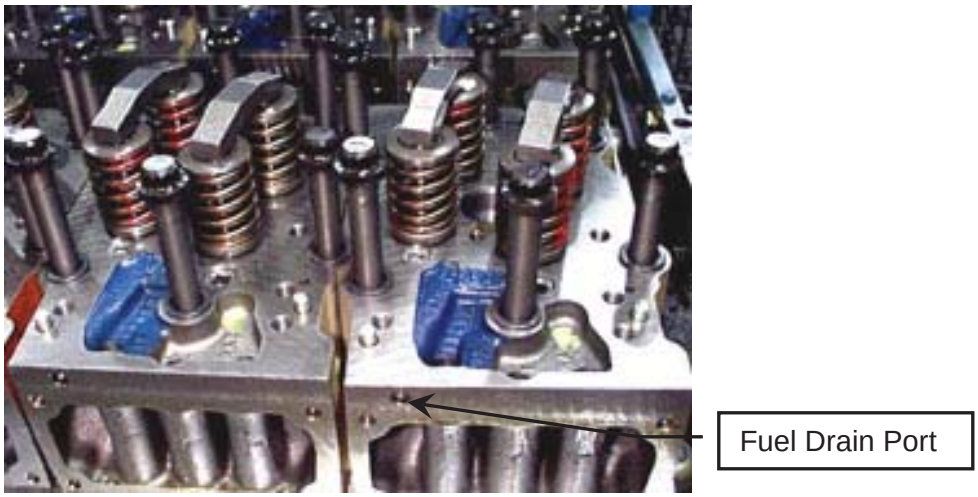


Figure 4

Rocker Levers and Rocker Lever Housing

The QSK50 utilizes rocker levers very similar to the rocker levers on KTA50. The difference is the removal of the injector push tubes and rocker levers (see Figure 5). A spacer is used in place of the rocker lever.

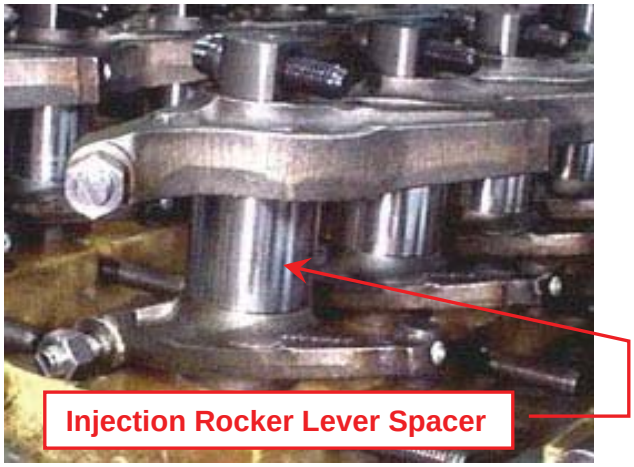


Figure 5

The QSK50 rocker lever housing remains largely unchanged from the KTA50 rocker lever housing. The key difference is the upgrade to a four bolt mounting arrangement for the valve cover to improve sealing.

Valve Cover

A new cast aluminum valve cover has been designed to accommodate the new injectors (see Figure 6). A four bolt clamping pattern will be employed for the new cover.

Figure 6

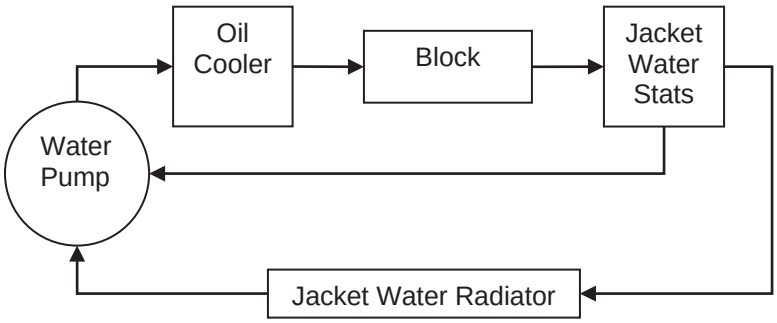
Cooling System

The cooling system is a two pump / two loop system that requires both an engine coolant loop radiator and a low temperature aftercooling (LTA) radiator.

The total system heat rejection has increased from the KTA50 model as a result of the revised combustion characteristics required to meet Tier 2 EPA emission levels. Items that contribute to this are increased turbocharger compressor outlet temperatures and increased air flow. However, maximum coolant temperature (top tank temperature) remains unchanged at 220 °F.

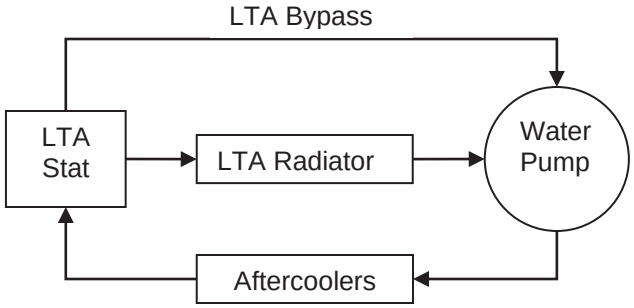
Engine Coolant Loop

The two pump / two loop cooling system employed on the QSK50 is different from the KTA50 pump / two loop and one pump / two loop cooling system. As mentioned previously the LTA aftercoolers are located on their own loop. The main engine loop now consists of the oil cooler, engine block, jacket water thermostats and water pump.



Aftercooler Coolant Loop

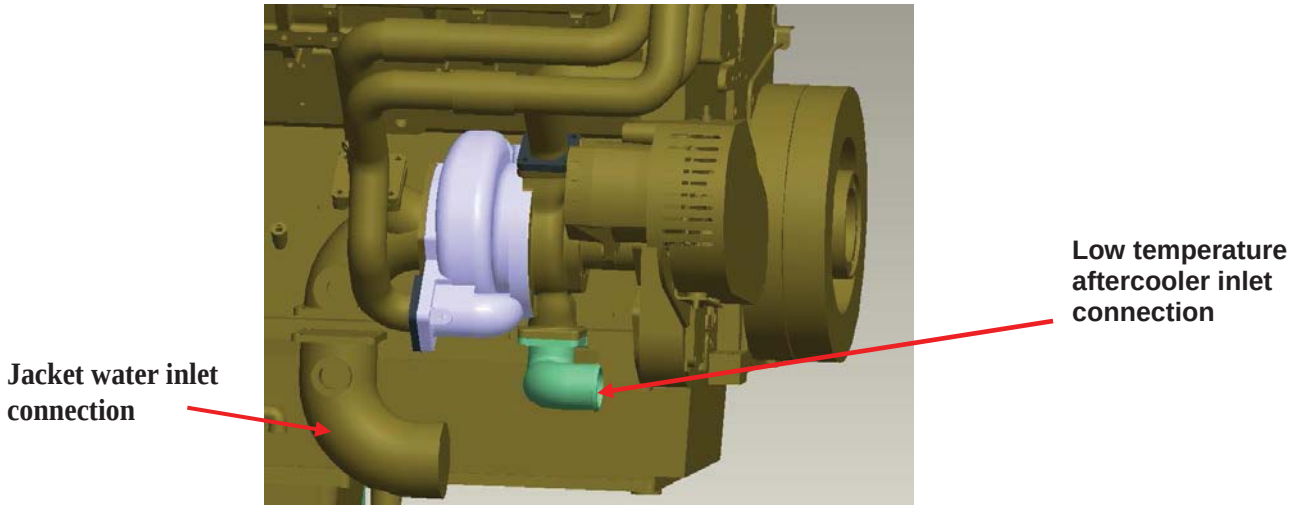
The QSK50 uses an aftercooler similar to the aftercooler used on the KTA50. (An aftercooler is a coolant-to-air heat exchanger used to reduce the temperature of the air entering the intake manifold.) Unlike the two pump / two loop KTA50 ratings, the coolant that is supplied to the QSK50 aftercooler core is on a separate loop from the engine coolant. This coolant loop must have its own radiator or remote heat exchanger. The aftercooler radiator must be designed to provide coolant cold enough to cool the intake air to 60 °C (140 °F) on a 25 °C (77 °F) ambient day. Maximum inlet water temperature to the aftercoolers is 65 °C (150 °F) on a 25 °C (77 °F) ambient day.



Common Cooling System Expansion Tank is required based on the Tier 2 water pump design. The new pump incorporates two impellers, which are the jacket water and low temperature aftercooling circuits, onto a single shaft. A maximum of 3 gal/min is transferred from the low temperature aftercooling circuit to the jacket water circuit within the pump assembly; therefore a common expansion tank (top tank) or a balance line between expansion tanks (top tanks) is required.

Coolant Inlet and Outlet Connections

The coolant inlet and outlet connections are located in the same areas as the KTA50 water inlets and outlets. The connections have changed slightly. Please refer to the installation drawing for more detailed information.



Other customer coolant option

Corrosion filters will continue to be required and remain unchanged.

Air Handling and Exhaust System

QSK50 engines with single stage turbo charging will utilize two Holset HX82 turbochargers in conjunction with a modified KTA50 exhaust manifold.

Air Intake

Air mass flow has increased by approximately 11% over the KTA50 as a result of the new turbocharger. The intake air restriction remains unchanged. (See applicable data sheets for more information.)

Turbochargers

The Holset HX82 turbocharger employs both a larger compressor and extended compressor inlet when compared to the Holset HC5A employed on the KTA50. This technology is referred to as a Map Width Enhanced (MWE) compressor inlet (see Figure 7). The larger compressor is required to provide higher air flows to meet performance requirements while meeting Tier 2 emission levels. The extended inlet flange, however, is required to provide improved turbo stability at varying operating speeds by reducing air flow recirculation.

Figure 7

Compressor Inlet and Exhaust Connections

The turbo intake and exhaust connections for the single stage QSK50 engine configuration are listed below.

Compressor Intake Connection: 139 mm (5.5 in)
Turbine Exhaust Outlet Connection: 170.7 mm (6.72 in)

The recommended exhaust piping size is 8 in (inner diameter). Exhaust restriction limits are on the datasheet for the static pressure measured with this piping size.

Lubrication System

Filtration

A recently released lube oil filter head option will be used for the new engine configuration. The option utilizes a filter head with an adapter that accommodates four LF9024 Venturi Combo lube filters. The LF9024 lube filter is a full flow with bypass filter from Fleetguard that provides improved filtration. The filter option is also common with other engine platforms, such as the QSK45, QSK60, and QSK78.

Breather

The breather arrangement on the QSK50 is common with the KTA50.

Fuel System

The QSK50 Tier 2 engine incorporates a new Cummins high pressure fuel pump and Modular Common Rail fuel System (MCRS). The fuel pump, solenoid controlled electronic injectors, and the engine electronic control module provide full authority electronic control for fuel delivery; thus, both injection pressure and timing can be accurately controlled.

Operational Overview

The new MCRS utilizes an electric priming pump, which is integrated with the off-engine fuel filter head and is controlled and powered by the engine ECM. During starting the electric priming pump pulls fuel from the tank through the Stage-1 fuel filters. The priming pump pressurizes the inlet to the mechanically driven gerotor pump. After the engine starts, the electric lift pump is shut off and bypassed so that the gerotor draws fuel directly from the tank through the Stage-1 filter.

The gerotor pump on the rear of the high pressure pump supplies approximately 100 psi of fuel pressure through the Stage-2 fuel filter and to the high pressure pump. The pump pressurizes the fuel to the desired injection pressure. This is defined by the software calibration and controlled by the inlet metering valve (IMV). Pressure at the outlet of the pump can be as high as 1600 bar (23200 psi). The fuel is then delivered to the fuel injectors. Double wall fuel lines are used to deliver fuel from the fuel pump and to each of the 16 injectors, which are plumbed in series. (See Figure 8.)

Note: External fuel shutoff valves are no longer required because the injectors are electronically actuated. They will not deliver fuel if the emergency stop or the run/stop switch is in the stop position.

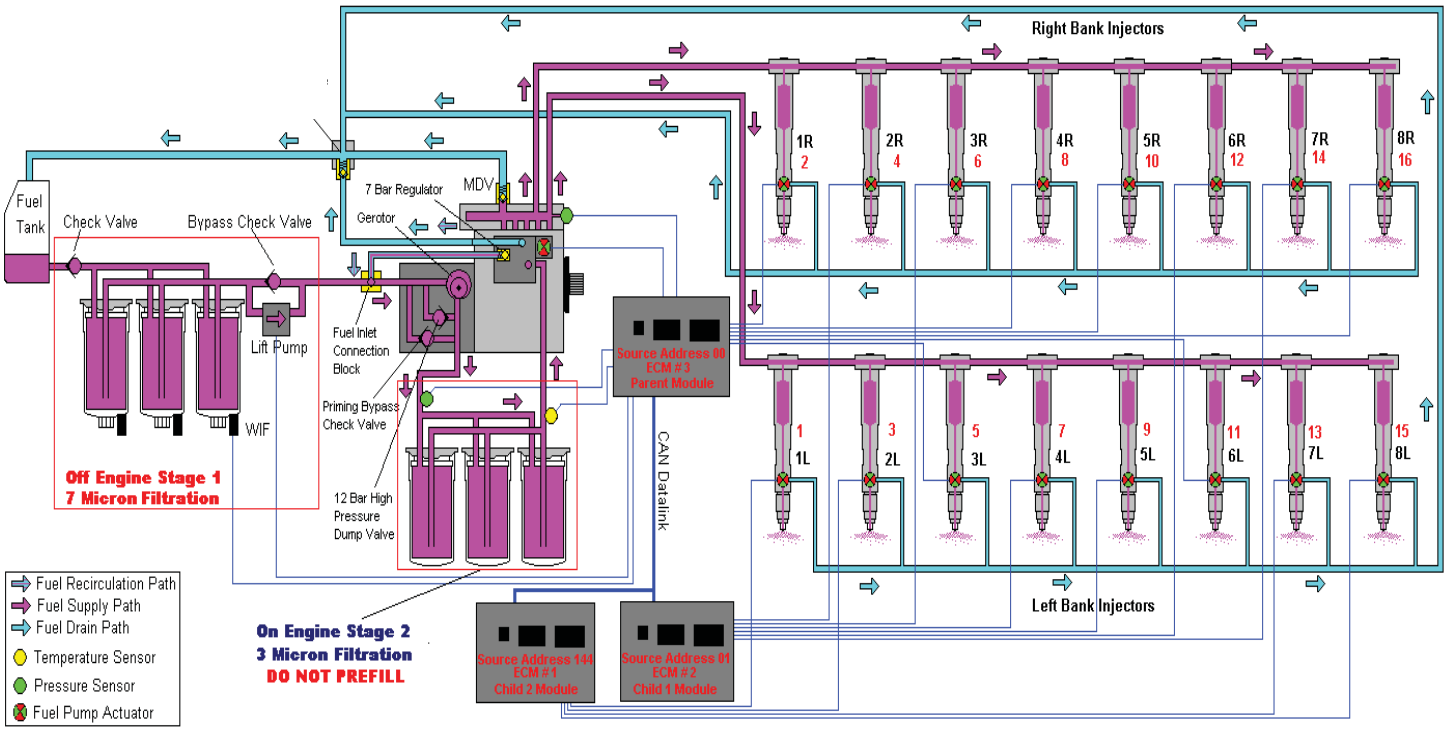


Figure 8 Modular common rail fuel system flow diagram

Electronic Injector

New electronically actuated injectors have been incorporated into the new configuration for advanced fueling and timing control (see Figures 9 and 10). The new injector is capable of precise and accurate fuel metering and timing control. Each injector now includes its own integrated accumulator, which helps to eliminate pressure pulsation between injectors and improve stability. As such, the injectors can now be connected in series as opposed to needing a large common fuel rail and being connected in parallel; thus, the new system has become a modular common rail system (MCRS).

Figure 9

Figure 10

The injector is positioned in the center of the cylinder head and is much longer than the previous mechanically actuated unit injector. The new injector now protrudes through the valve cover for fuel pipe accessibility, and to accommodate the electrical connections (see Figure 10). Removal distance for the injector is 270 mm (10.6 in).

Fuel Pump

The new fuel system uses a five cylinder pump to deliver fuel to the electronic injectors at very high up to 1600 bar (see Figure 11).

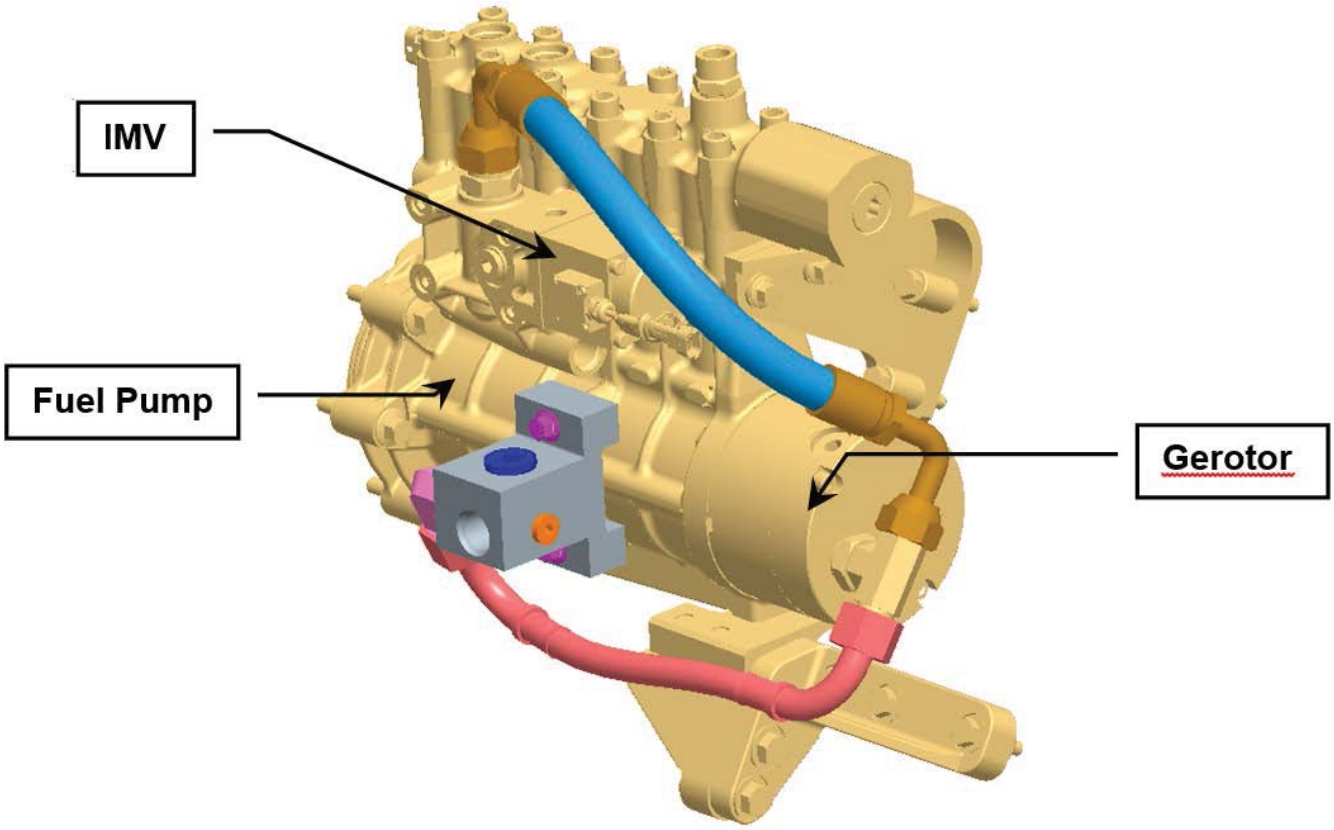
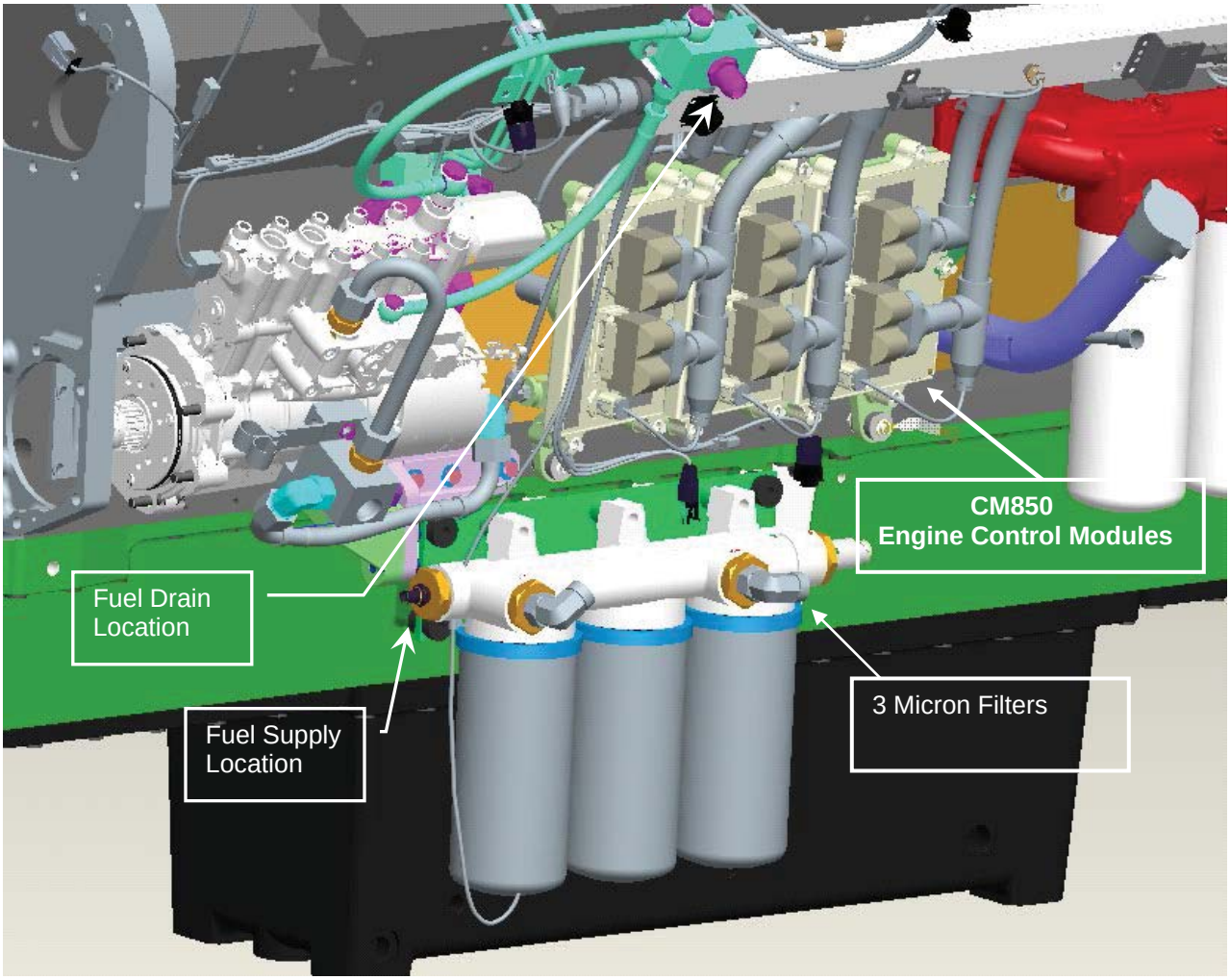


Figure 11

The pressure is controlled by an electronic actuator at the pump inlet called the inlet metering valve (IMV) and is measured by a special pressure sensor that is mounted on the top of the pump. The pump is lubricated by engine oil for long durability and it includes a mechanically driven gerotor pump on the rear that is used to feed fuel into the high pressure pumping section.

Fuel Filter Head and Fuel Filters

The new fuel system configuration includes a new fuel filter head with an integral electronic priming pump and two stages of fuel filters (see Figure 12). Two stage fuel filtering is required to improve the filtering efficiency of the system.



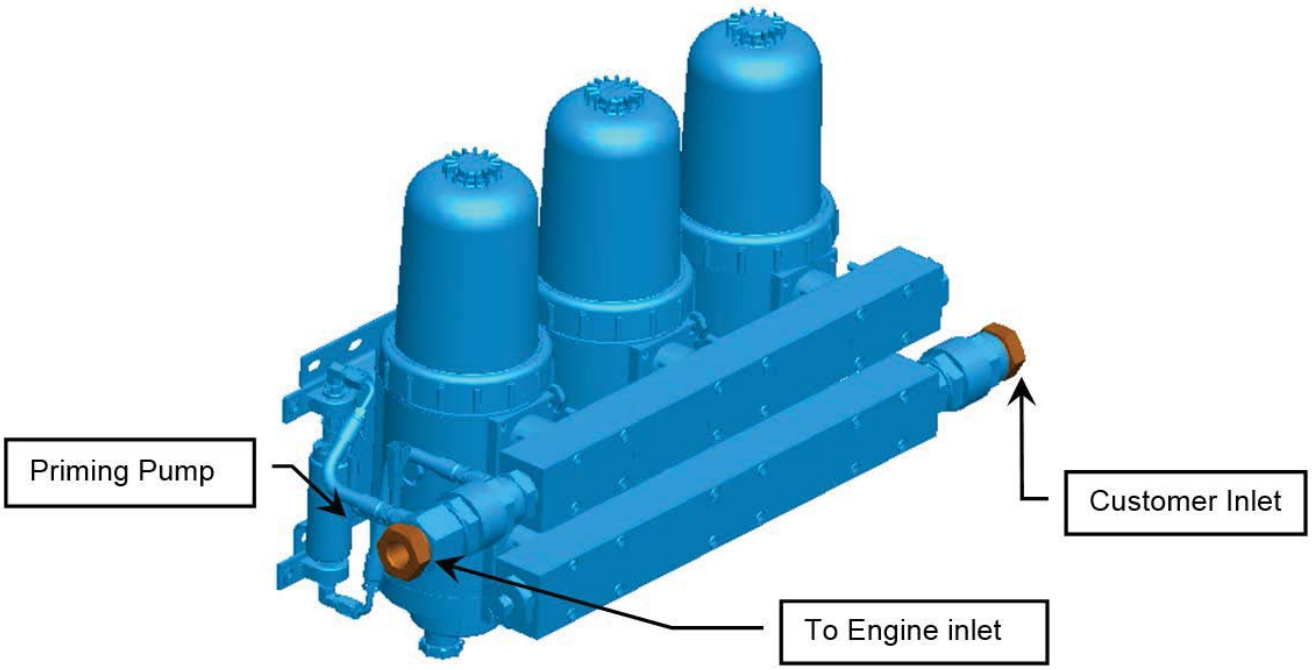


Figure 13

The Stage-1 (or suction side) filter provides 7 micron filtration (Figure 13) and includes water separation capability. The Stage-2 (or pressure side) filter provides 3 micron filtration after the gerotor pump. The QSK50 engine will be equipped with a Fleetguard FF19763 filter for Stage-1 and two Fleetguard FF5607 filter for Stage-2. Service intervals for both filters are 500 hours.

Fuel Coolers

Heat rejection to the fuel is low enough to allow customers to run without a heat exchanger on the fuel drain.

Fuel Supply and Drain Connections

The fuel supply connection is located on the fuel filter head, on the left bank of the engine. The fuel drain connection has been integrated into the fuel pump plumbing, which is also located on the left side of the engine (see Figure 12).

The fuel supply and drain fitting are both the same size as defined below.

Fuel Supply: 1 1/16-12 UNF, elbow union
Fuel Drain: 1 1/16-12 UNF, straight union

Electronic Engine Control System

The new QSK50 engine uses a state of the art, integrated electronic control system. The core of the system is the new CM850/CM2150 Electronic Control Module (ECM) to provide advanced engine control and an enhanced electronic feature set. The new electrical system uses all of the base engine sensors. The three CM850/CM2150 modules are mounted on the left bank of the engine near the pan rail (see Figure 12).

The OEM connectors are located at the back, left side of the engine in approximately the same location as the current QSK engine configuration (see Figure 14). Two OEM connections are now required for the new configuration since the power, ground, and key switch inputs have been broken out separately. The OEM connectors required for the new configuration are the following:

- Power Connector
  - Deutsch HD34-24-16PE
  - Sixteen 12 Gauge (AWG) Contacts
- OEM Connector B
  - Deutsch HD34-24-31PE
  - Thirty One 16 Gauge Contacts

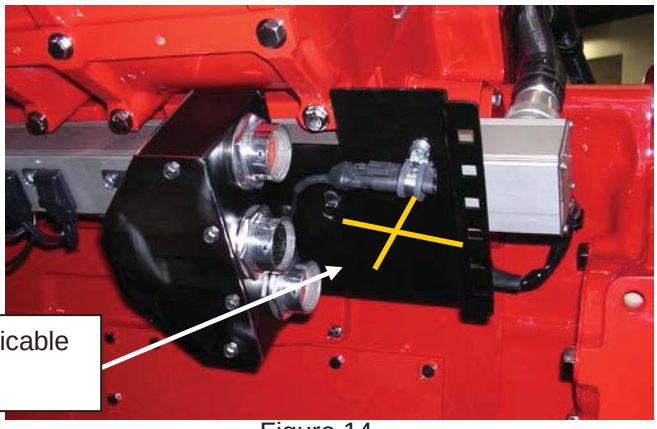


Figure 14

Customer Option Discussion

Engine Configuration

The technical configuration number for the QSK50, Tier 2 engine is D283039GX03 (single stage turbo charging).

Pricing Specs and Product IDs

For the latest Pricing Specs and Product IDs please refer to the link below.

https://gce.cummins.com/pgce/pg_main/g-drive_global_index.html

Customer Option Changes

For information about customer options please refer to the following link.

https://gce.cummins.com/pgce/pg_main/g-drive_global_index.html

Accessory Drive Pulley

The accessory drive pulley option (AD Option) has changed from a mandatory to a general option. All of the AD options will be released under the new configuration, including the specification for just the timing hub.

Cabin Heater Plumbing

A new mandatory option category for the cabin heater plumbing (HC Option) has been added to the new configuration that helps to define the water manifold plumbing arrangement. The three options available are the following:

HC 6005 – This option includes a 1 1/16 UN plumbing port at the back of the right bank water manifold.
HC 6006 – This option includes a 1 1/16 UN plumbing port at the back of the left bank water manifold.
HC 6007 – This option includes cup plugs to seal both ports.

Installation Recommendations

Installation recommendations and requirements will be based on the stated data sheet values for these engines, as well as current recommendations and requirements discussed in the relevant AEB/CEBs. New installations of the QSK50 Tier 2 engines are subject to a G-Drive Installation Design Review.

Service Publications

Service literature is currently being developed for the new engine configuration and is expected to be complete prior to production launch. (See Table below for a list of reference material being developed.)

QSK50 Service Literature

Literature Description	Part Number
Electronic Troubleshooting and Repair Manual	4021533 (CM850) 4022102 (CM2150)
Operation and Maintenance Manual	3810497
Service Manual	4021528
Wiring Diagram	4021537 (CM850) 4022111 (CM2150)
Advance Engine Monitoring (CM2150)	2883461

Revision History

Revision	Date	Author	Description	Page(s)
03	10Feb16	Liz McLean	Added text “EPA”.	1
02	11Jan16	Arine Hillery	Initial creation of CEB from AEB 10.139.	All
01	18Feb13	Ayman Hamid	Updated information about TPEM and NSPS rule. Updated Fuel Rating and Altitude Capability section by deleting text and table and adding a link to GCE. Added CM2150 to the Electronic Engine Control System section. Updated Pricing Specs and Product IDs section by deleting text and table and adding a link to GCE. Updated Customer Option Changes section by deleting text and adding a link to GCE. Updated Service Publications section with CM2150 document information. Deleted Appendix A and Appendix B.	1 3 13 13 13 14
00	June 2006	Eric Fay	New Release	All

102-002 Maintenance Schedule

General Information

All maintenance procedures listed for previous intervals **must** also be performed.

For convenience, listed below are the section numbers that contain specific instructions for performing the maintenance.

The K38, K50, QSK38 and QSK50 engines have the following lubricating oil filtration options:

Marine and Industrial

- Spin-on Oil Filter without Centrifuge and without Centinel™
- Spin-on Oil Filter with Centrifuge and without Centinel™
- Spin-on Oil Filter without Centrifuge and with Centinel™
- Spin-on Oil Filter with Centrifuge and with Centinel™
- Eliminator™ without Centinel™
- Eliminator™ with Centinel™.

Power Generation

- Spin-on Oil Filter without Centrifuge and without Centinel™
- Spin-on Oil Filter with Centrifuge and without Centinel™
- Spin-on Oil Filter without Centrifuge and with Centinel™
- Spin-on Oil Filter with Centrifuge and with Centinel™
- Eliminator™ without Centinel™
- Eliminator™ with Centinel™.

The following applicable maintenance schedule for the engine application and the specific oil filtration option used.

Marine and Industrial

Spin-on Oil Filter without Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 Months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Lubricating Oil and Filters - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]

- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Air Shutoff Valve - Inspect for Reuse

Spin-on Oil Filter with Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Lubricating Oil and Filters - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Fleetguard® Centrifuge - Clean
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Air Shutoff Valve - Inspect for Reuse

Spin-on Oil Filter without Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check

- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Lubricating Oil Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Air Shutoff Valve - Inspect for Reuse

Spin-on Oil Filter with Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Lubricating Oil Analysis - Check
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- Charge-Air Cooler - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Lubricating Oil Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Fleetguard® Centrifuge Filter - Clean

- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Air Shutoff Valve - Inspect for Reuse

Eliminator™ without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Eliminator™ Filter Rotation - Check
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change

- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 250 Hours or 1 Year (Section 5)

- Lubricating Oil and Filters - Change

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge - Clean and Check
- Eliminator™ Filter Pressure - Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Air Shutoff Valve - Inspect for Reuse

Eliminator™ with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Eliminator™ Filter Rotation - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge - Clean
- Eliminator™ Filter Pressure - Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check

- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Air Shutoff Valve - Inspect for Reuse

The below list is in reference to the upper indexes used in above Marine and Industrial scheduled maintenance.

1. Mechanically actuated injector engines **only**.
2. Electronically actuated injector engines **only**. Alternate fuel filter drain informationis available in the oil drain and fuel filter section of this procedure.
3. After an initial adjustment at 1500 hours, it is recommended that the valves and injectors **not** be adjusted again prior to injector calibration at the 6000 hours or 2 years interval.
4. Calibration **must** be performed by the nearest Cummins® Authorized Repair Location.
5. Recommended at engine half life to rebuild. Half life varies by application. Contact the nearest Cummins® Authorized Repair Location if the interval can **not** be determined.
6. CENSE™ CM530 modules **only:** Reset is **not** necessary on CM2330 modules.

Power Generation

Spin-on Oil Filter without Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 Months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 250 Hours or 1 Year (Section 5)

- Lubricating Oil and Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush

- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Crankcase Breather Element - Change
- Air Shutoff Valve - Inspect for Reuse

Spin-on Oil Filter with Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Lubricating Oil and Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Fleetguard® Centrifuge - Clean
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Crankcase Breather Element - Change
- Air Shutoff Valve - Inspect for Reuse

Spin-on Oil Filter without Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check

- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 Months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Lubrication Oil and Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]

- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Crankcase Breather Element - Change
- Air Shutoff Valve - Inspect for Reuse

Spin-on Oil Filter with Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Lubricating Oil Analysis - Check
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- Charge-Air Cooler - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Lubricating Oil Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Fleetguard® Centrifuge Filter - Clean
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Crankcase Breather Element - Change
- Air Shutoff Valve - Inspect for Reuse

Eliminator™ without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Eliminator™ Filter Rotation - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain

- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 250 Hours or 1 Year (Section 5)

- Lubricating Oil and Filters - Change

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge - Clean
- Eliminator™ Filter - Pressure Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Crankcase Breather Element - Change
- Air Shutoff Valve - Inspect for Reuse

Eliminator™ with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Centinel™ Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Air Cleaner Precleaner - Clean
- Air Intake Piping - Check
- Air Cleaner Restriction - Check
- Air Tanks and Reservoirs - Drain
- Marine Gear - Check
- Drive Belts - Check
- Fuel Filter, Remote Mounted[2] - Drain
- Eliminator™ Filter Rotation - Check
- Fuel Filter, Remote Mounted[2] - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)[1] - Change
- Fuel Filter (Stage 1)[2] - Change
- Fuel Filter (Stage 2)[2] - Change
- Coolant Filter - Change
- Fan, Cooling - Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check
- Zinc Anode - Check
- CENSE™ Datalogger - Reset[6]
- Engine Support Bracket, Front - Check
- Engine Mounts - Check
- Water Pump Weep Hole Filter - Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge - Clean
- Eliminator™ Filter - Pressure Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning - Clean
- Overhead Set Outer Base Circle (OBC) - Adjust[1,3]
- Overhead Set (Travel Method) - Adjust[1,3]
- Engine Oil Heater - Check
- Coolant Heater - Check
- Fan Drive Idler Arm Assembly - Check
- Radiator Hoses - Check
- Cooling Fan Belt Tensioner - Check
- Air Compressor Discharge Lines - Check
- Batteries - Check
- Battery Cables and Connections - Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump - Calibrate[1,4]
- Cooling System - Flush
- Fan Hub, Belt Driven - Check
- Sea Water Pump - Check
- Water Pump - Check
- Air Compressor Unloader and Valve Assembly - Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector - Calibrate[1,4]
- Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors - Replace[2,5]
- Vibration Damper, Viscous - Check
- Crankcase Breather Element - Change
- Air Shutoff Valve - Inspect for Reuse

The below list is in reference to the upper indexes used in above Power Generation scheduled maintenance.

1. Mechanically actuated injector engines **only**.
2. Electronically actuated injector engines **only**. Alternate fuel filter drain information is available in the oil drain and fuel filter section of this procedure.
3. After an initial adjustment at 1500 hours, it is recommended that the valves and injectors **not** be adjusted again prior to injector calibration at the 6000 hours or 2 years interval.
4. Calibration **must** be performed by the nearest Cummins® Authorized Repair Location.
5. Recommended at engine half life to rebuild. Half life varies by application. Contact the nearest Cummins® Authorized Repair Location if the interval can **not** be determined.
6. CENSE™ CM530 modules **only:** Reset is **not** necessary on CM2330 modules.

Oil Drain and Fuel Filter Change Intervals

CAUTION

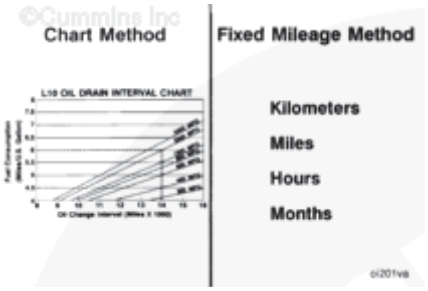
The use of a synthetic base oil does not justify extended oil change intervals. Extended oil change intervals can decrease engine life due to factors such as corrosion, deposits, and wear.

CAUTION

Do not extend oil change intervals beyond the maximum point shown when fuel consumption rates are less than the minimum shown. Doing so can result in shortened engine life due to oil degradation processes associated with lightly loaded engines.

Do **not** extend oil and filter change intervals beyond those specified configurations in the maintenance schedule, unless the chart method is used. See the oil interval charts in this section.

The chart method provides no benefit to a customer that is operating with a Centinel™ system. Therefore, the fixed hour method can always be used when Centinel™ is utilized.



CAUTION

Inaccurate fuel consumption records can result in incorrect oil change intervals that can result in premature engine wear and/or deposits.

CAUTION

Do **not** extend oil change intervals beyond the maximum point shown when fuel consumption rates are less than the minimum shown. Doing so can result in shortened engine life due to oil degradation processes associated with lightly loaded engines.

Oil change intervals can be determined by one of the following recommended methods:

- Fixed-Hour Method (based on fixed hours or months, whichever occurs first)

- Chart Method (based on known fuel consumption rates, coupled with oil analysis program)

The chart method is recommended to provide the lowest total cost of operation, while still protecting the engine.

The information listed below is required when using the chart method to determine the correct oil and filter change interval for the engine.

- Oil system capacity (sump plus any remote tank volume)
- Average fuel consumption rate
- Classification of oil as standard or premium
- Oil analysis to demonstrate the chart method interval is acceptable.

Sump capacity can be determined by knowing the volume of the oil required to touch the high-level mark on the dipstick. Oil sump capacities are listed in the operation and maintenance manuals for all Cummins® engines. It is imperative that the total system volume be known when using the chart method. Use the following procedure for oil sump capacity information. Refer to Procedure 018-017 in Section V.

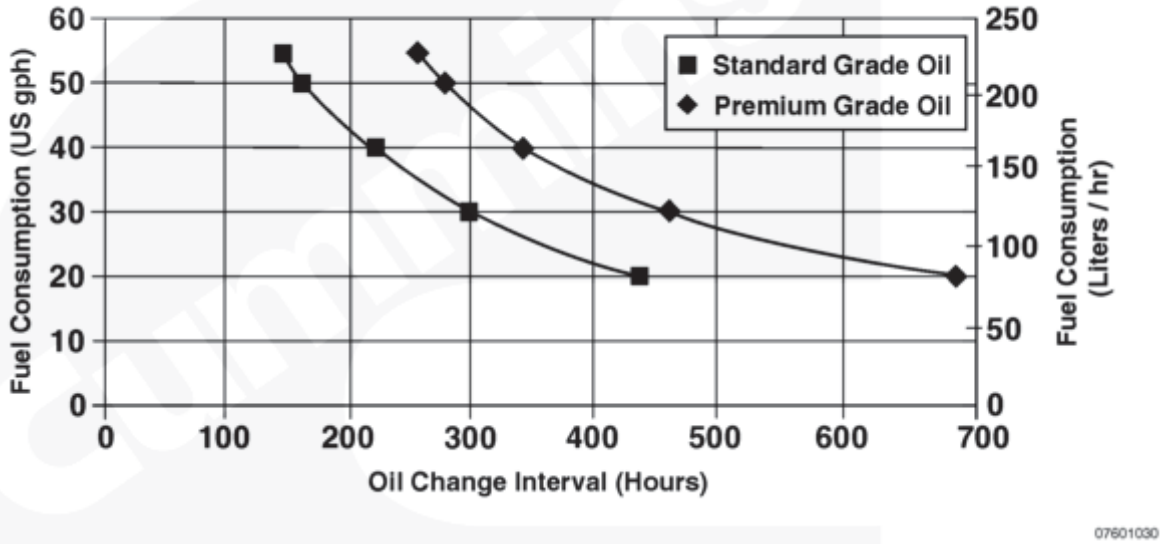
To use the chart method effectively, accurate fuel consumption records **must** be kept and maintained. Fuel consumption information **must** be in liters per hour or gallons per hour units to use the charts. Fuel consumption rates can change over time because of an increasing or decreasing engine duty cycle. Accurate records are essential in determining average fuel consumption during a given oil change interval.

The charts are categorized and labeled by the system capacity for a specific engine family. Select the chart representing the correct oil system capacity for the engine model in question. The left vertical axis of the chart represents fuel consumption in gallons per hour. Determine the intersection point of the fuel consumption rate on the applicable interval curve by drawing a horizontal line. From this point, draw a vertical line down until it intersects with the horizontal axis representing hours. This point represents the acceptable oil change interval.

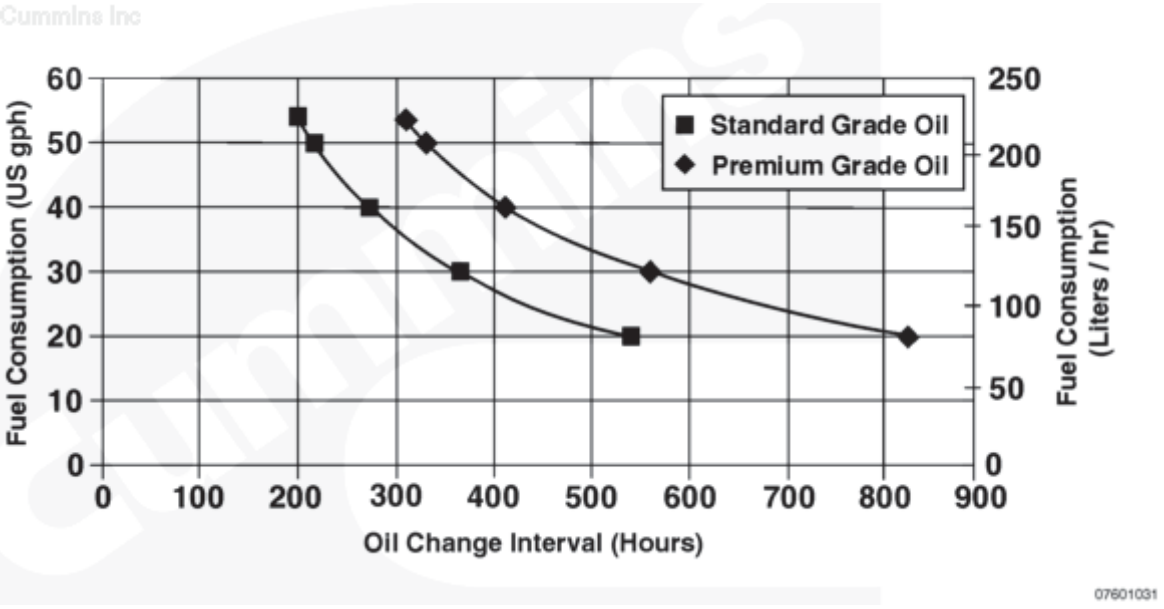
Lubricating Oil Filters

Premium filters are recommended, in conjunction with premium grade oils, when using the premium grade oil curves to determine oil change intervals. Premium filters contain synthetic media materials to provide more efficient filtration for the entire service life and to extend the media life over conventional cellulose media. Premium full-flow filters are made with synthetic media and have the StrataPore™ designation on the outside of the filter. StrataPore™ filters have the efficiency, capacity, and strength needed for this extended service.

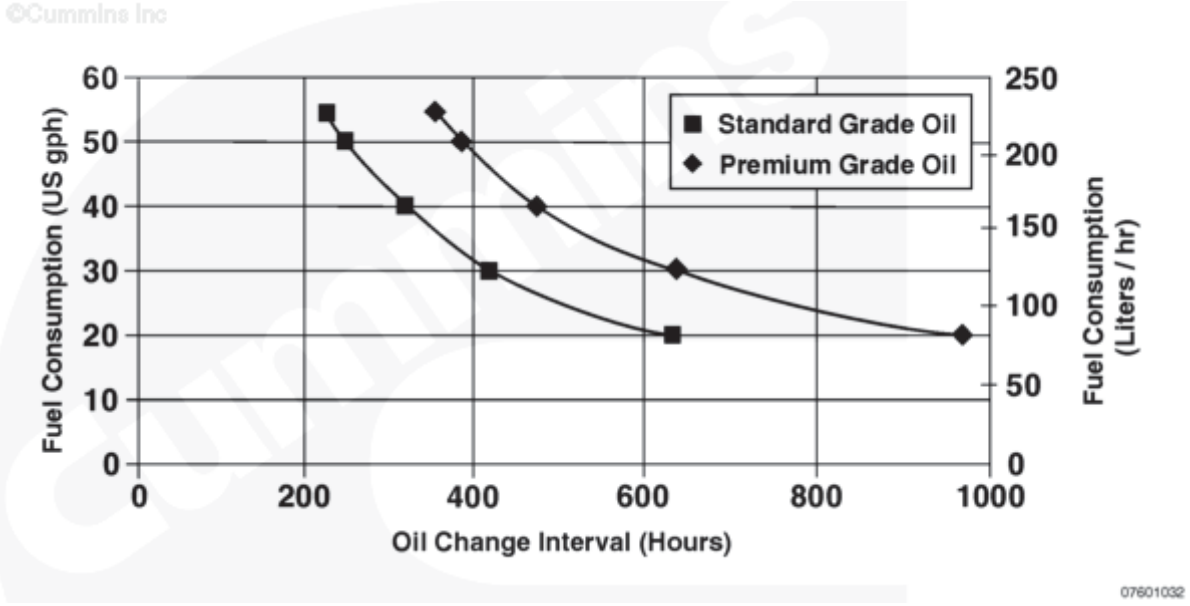
All Applications



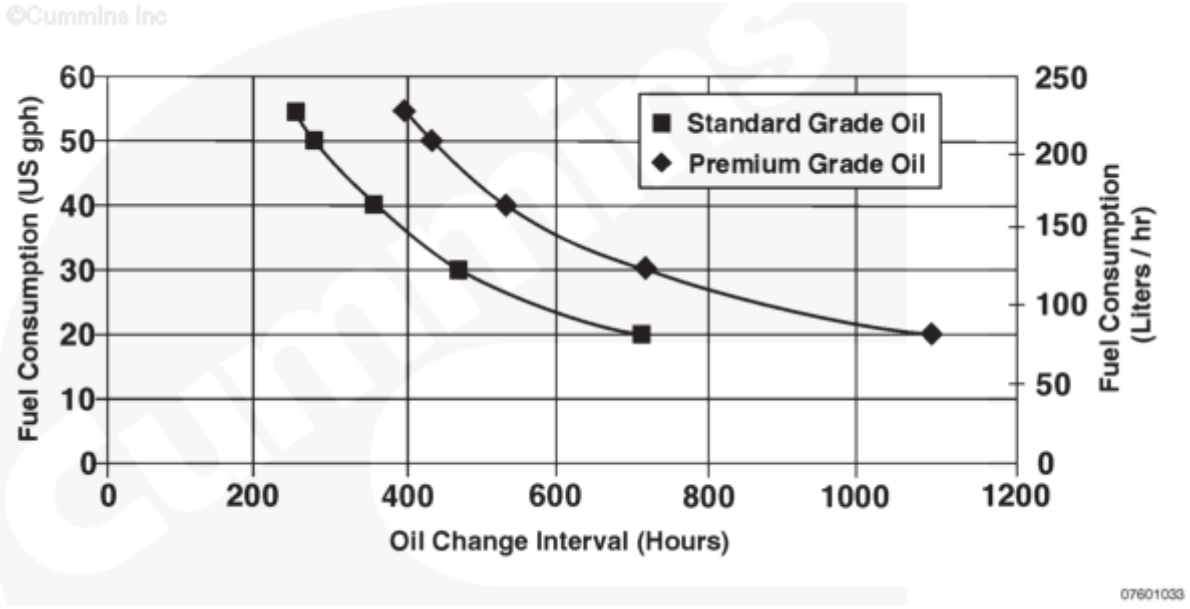
K38 Oil Change Interval - 113 liter [30 gal] Sump (with spin-on or Eliminator™ filters)



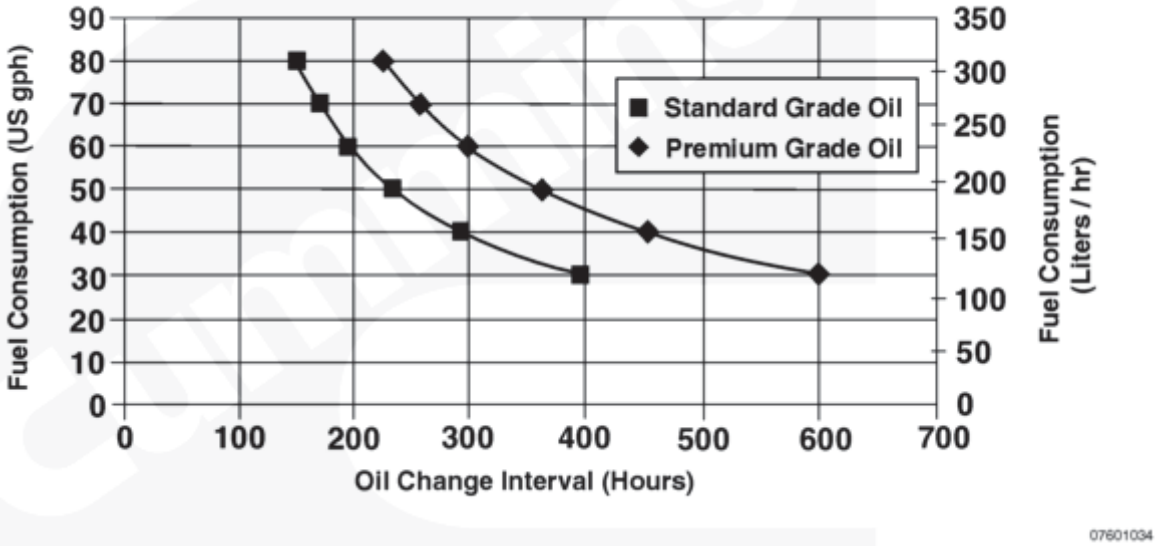
K38 Oil Change Interval - 140 liter [37 gal] Sump (with spin-on or Eliminator™ filters)



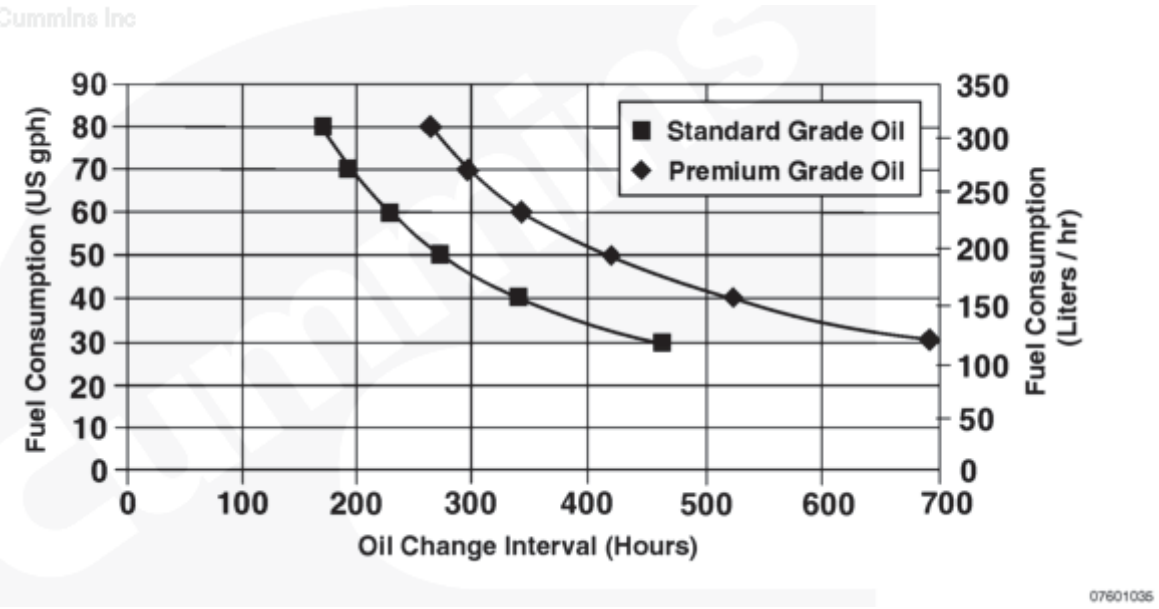
K38 Oil Change Interval - 166 liter [44 gal] Sump (with spin-on or Eliminator™ filters)



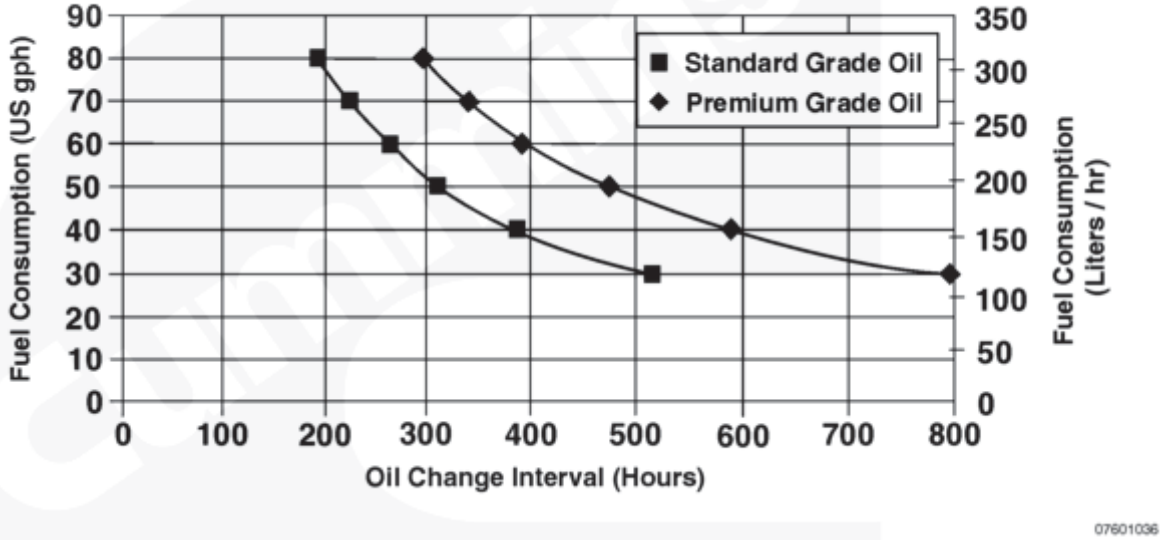
K38 Oil Change Interval - 185 liter [49 gal] Sump (with spin-on or Eliminator™ filters)



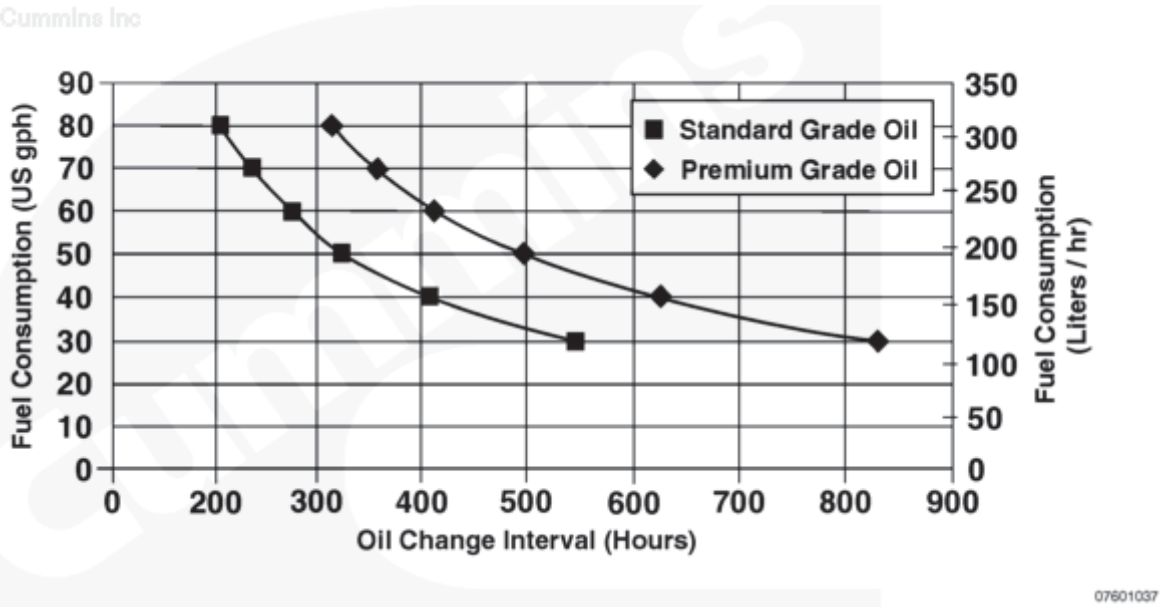
K50 and QSK50 Oil Change Interval - 151 liter [40 gal] Sump (with spin-on or Eliminator™ filters)



K50 and QSK50 Oil Change Interval - 178 liter [47 gal] Sump (with spin-on or Eliminator™ filters)



K50 and QSK50 Oil Change Interval - 204 liter [54 gal] Sump (with spin-on or Eliminator™ filters)



K50 and QSK50 Oil Change Interval - 216 liter [57 gal] Sump (with spin-on or Eliminator™ filters)

Fuel Filter Change Intervals for Electronicaly Actuated Injector Engines Only

- Fuel filter change intervals are set at 250 hours in order to protect the fuel system from hard particles.
- **Not** all fuel filters available on the market are equivalent, and may **not** protect the fuel system adequately beyond the 250 hour threshold.
- Cummins Inc. requires the following hardware to achieve Stage 1 and Stage 2 fuel filter change intervals beyond 250 hours, and up to but **not** exceeding 500 hours:

- FH239 series Industrial Pro filter head **must** be installed as the Stage 1 fuel filter head.
- Fleetguard® NanoNet™ media fuel filters **must** be used on Stage 1 and Stage 2 fuel filters.
- Use the following procedure for fuel filter part numbers. Refer to Procedure 018-024 in Section V.

Cummins Inc. does **not** recommend fuel filter change intervals exceed 500 hours.

The most common cause of degraded engine performance is poor fuel quality. Fleetguard® NanoNet™ media filters are designed to function with greater filtration efficiency than other filters, and thus retain more contaminants. If premature filter plugging is observed, additional filtration or improved fuel quality may be necessary to reach desired maintenance intervals. For more information on fuel cleanliness recommendations, reference the “Fuel Cleanliness” section of the Fuels For Cummins® Engines, Bulletin 3379001.

Coolant Drain Interval

Maintenance Intervals for Cooling System up to 568 liters [150 gal]					
	System Size in liters [gal]				
	79-144 [21-30]	117-189 [31-50]	193-284 [51-75]	288-378 [76-100]	382-568 [101-150]
Hours	Units of SCA				
751-1000	25	50	80	75	150
501-750	20	35	60	100	110
251-500	15	25	40	50	75
0-250	10	15	20	25	40

Maintenance Intervals for Cooling System up to 1514 liters [400 gal]					
	System Size in liters [gal]				
	572-757 [151-200]	761-946 [201-250]	950-1135 [251-300]	1139-1325 [301-350]	1329-1514 [351-400]
Hours	Units of SCA				
751-1000	200	250	300	350	400
751-1000	150	190	225	260	300
251-500	100	125	150	175	200

Maintenance Intervals for Cooling System up to 1514 liters [400 gal]					
System Size in liters [gal]					
0-250	50	65	75	90	100

Notes:

A. Consult the vehicle equipment manufacturer's maintenance information for total cooling system capacity.
B. When draining and replacing the coolant, **always** pre-charge the cooling system to a SCA level of 1.5 units per gallon. This concentration level **must not** be allowed to go below 1.2 units and **must** be controlled when the level is greater than 3 units. Action needed when the level goes below 1.2 is a filter and liquid pre-charge; from 1.2 to 3.0 units, filter **only**; above 3.0, test at every oil change until the level falls to 3.0 or below.
C. For coolant filter part numbers and SCA capacity. Refer to Procedure 018-024 in Section V.
D. Change coolant filters at each oil change to protect the cooling system. Consult the coolant capacity chart to determine the correct coolant filter for a given cooling system capacity and oil drain interval.

Last Modified: 09-Dec-2015

Engine No. SAMPLE	Advert. Power HP/kW 967 /721 AT 1800 RPM	ECS. DDI ECM TC CAC	**EMISSION CONTROL INFORMATION**: In the U.S. this engine may be used only in Stationary Emergency applications in accordance with requirements of 40 CFR part 60 and is excluded from the requirements of 40 CFR parts 89 and 1039. Installing or using this engine in any other application may be a violation of U.S. Federal law subject to civil penalty. This engine is certified to operate on diesel fuel.
EPA Family HCEXL050.AAD	Advert. Power HP/kW / AT RPM	Disp. L 19.0	
FR FR0458200	NO_x FEL PM FEL	Inj. Timing KU	WARNING: Injury may result and warranty is voided if fuel rate, RPM, or altitudes exceed published maximum values for this model and application.
Date of Mfg.	Power Category	CPL 3866	
Model QSK19-G8	Valve Lash Cold IN/mm 0.014/0.356 Int.	0.027/0.686 Exh.	Warranty Start Date
Ref. No. A041U120A		Cummins Inc. Assembled in U.S.A. 4333872	